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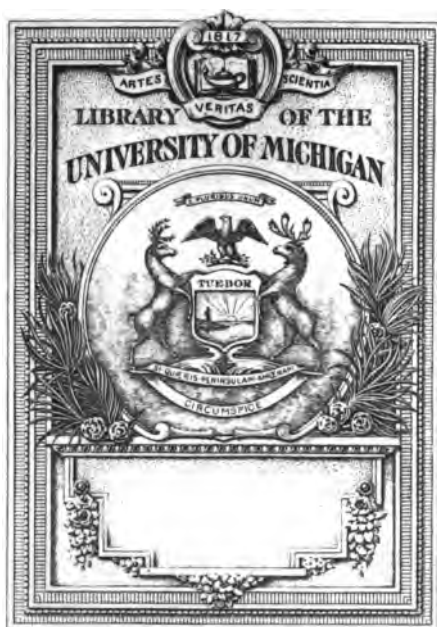
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THE UNIVERSITY OF MICHIGAN

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GRADUATE COURSES

A HANDBOOK FOR GRADUATE STUDENTS

With a List of Advanced Courses announced by eleven Universities of
the United States for the year

1893-94

COMPILED BY A
COMMITTEE OF THE GRADUATE CLUB OF HARVARD
IN CO-OPERATION WITH COMMITTEES OF SIMILAR CLUBS AT
CORNELL, JOHNS HOPKINS, AND YALE

BOSTON, U.S.A.
GINN & COMPANY, PUBLISHERS
1893

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The Athenæum Press
GINN & COMPANY, BOSTON, U.S.A.

PREFACE.

ALTHOUGH the need of an annually recurring list of graduate courses given in the principal universities of the United States has been for some time recognized, such a publication has been begun neither as a commercial venture nor as a work of love ; for the first there has been too little assurance of financial return, and for the second too probable suspicion of ulterior motives. The rise of Graduate Students' Clubs and their affiliation have afforded the opportunity for starting the work. Emanating from the Harvard Graduate Club, which has done the chief work of preparing for the press, the idea has been fully indorsed by the other clubs which have colabored in its fulfilment.

Since it would have been impracticable to have included the advanced courses offered by all universities in the United States, we have boldly selected eleven which we have regarded as, on the whole, the best, have given all their courses intended for graduates, and have included none others. Doubtless there are departments in other universities stronger than some of those given here ; but we have not included them in our book this year—those who edit this book next year may think best to do so.

In addition to names of courses, we have given the scholastic record of some of the instructors, in order to give some idea of where they have studied and of their special interests. These records have been obtained chiefly in response to printed inquiries sent out by us. Quite a large percentage of the instructors did not reply to these. We have also sometimes added a note concerning the department of a university, in order to give some idea of those phases of activity not revealed by lists of courses. It is not to be inferred that similar notes could not have been given for other universities, if the information had been at hand. In a word, we

have not attempted to give the reader the means of comparing departments in different universities. The courses offered in any department by the different universities are usually quite different, and ought always to be so. That university is best for the advanced student which seems to meet his peculiar needs. In deciding between universities, let him consult competent advisers and send to the institutions for further information.

The compilers are under obligations to all those instructors whose suggestions and kind expressions of appreciation have aided and encouraged them, and especially to those who have used their efforts to secure for us full replies to our inquiries. We would especially thank Mr. J. A. Hamilton of Cornell, Mr. E. B. Lease of Johns Hopkins, and Mr. F. A. Häuslein of Yale, the special committees from those universities, for their constant assistance and painstaking criticism. The "Yale Graduate Club" (distinct from the *Association*, see page viii), has also aided us in collecting data. To the publishers, Messrs. GINN & Co., we are indebted for the interest they have shown in our work and especially in securing its early publication.

We invite criticisms for the benefit of those who shall edit the second edition of this book, a year hence. All such may be sent to the Committee's Secretary, Mr. A. W. WEYSSE, Cambridge, Mass.

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THE GRADUATE CLUBS.

The Graduate Clubs of Cornell, Harvard, Johns Hopkins and Yale, coöperating in the publication of this book, are composed of graduate students at their universities. The conditions of membership to these clubs differ. In some cases all graduate students are, on that account, members of the clubs; in others there is a selection of the best. All these organizations make it an important part of their business to look after the interests of newly arrived graduate students at their universities, and to answer questions from graduate students seeking information about their universities.

The lists of officers of these associations for 1893-4 are as follows :

CORNELL GRADUATE STUDENTS' CLUB.

Pres., J. A. HAMILTON.

Sec.-Treas., W. J. ANDREWS.

Exec. Committee, H. J. EDMISTON,
and two others to be elected next fall.

HARVARD GRADUATE CLUB.

Pres., D. F. HOUSTON, So. Carolina Coll.

V. Pres., F. N. ROBINSON, Harvard.

Sec., A. M. DAY, Harvard.

Treas., C. E. ST. JOHN, Mich. Agric. Coll.

Executive Committee.

Classics : H. E. BURTON, Harvard.

A. L. BOUDURANT, Univ. of Miss.

Mod. Lang : F. N. ROBINSON, Harvard, *Chairman*.

Philosophy : E. PIERCE, Harvard.

C. M. BAKEWELL, Univ. of Cal.

History and Economics : D. F. HOUSTON, So. Carolina Coll.

A. M. DAY, Harvard.

Mathematics : C. H. ASHTON, Brown Univ.

Physics : C. E. ST. JOHN, Mich. Agric. Coll.

Chemistry : F. L. DUNLAP, Univ. of Mich.

Botany : H. M. RICHARDS, Harvard, L.S.S.

Zoölogy : A. W. WEYSSE, Harvard.

Geology : W. W. CLENDENIN, Missouri State Univ.

JOHNS HOPKINS GRADUATE STUDENTS' ASSOCIATION.

Hon. Pres., Professor HENRY WOOD.

Pres., T. S. BAKER.

V. Pres., C. W. JOHNSON.

Sec., J. H. HOLLANDER.

Treas., F. H. SYKES.

Social Committee.

G. M. BOLLING, Greek.

GEO. L. LEFEVRE, Biology.

T. R. BROWN, Chemistry.

LEGH W. REED, Astronomy.

G. W. WARD, History.

A. W. STRATTON, Sanskrit.

M. H. MALTBY, Mathematics.

National Committee.

G. V. EDWARDS, Latin.

GEORGE SHIPLEY, English.

R. R. TATNALL, Physics.

International Committee.

C. C. MARDEN, Romance Langs.

W. H. KIRK, Greek.

J. H. TUDOR, Mathematics.

GRADUATE ASSOCIATION OF YALE UNIVERSITY.

Pres., F. A. HÄUSLEIN.

Vice Pres., MARY GRAHAM.

Sec., EDWARD S. AMES.

Treas., R. H. KUNSTADTER.

ADDRESS
TO THE
Governing Boards of American Universities,
BY GRADUATE STUDENTS.

AT a meeting of affiliated clubs of graduate students, held in New York City, April 23d, 1893, at which representatives of the Cornell, Harvard and Johns Hopkins organizations were present, it was resolved to issue an address to the governing boards of American Universities touching certain interests of graduate students.

We wish then, at this time, to refer to two needs : first, uniformity in the requirements for the doctor's degree ; and, second, the facilitation of university intermigrations.

The Doctor's degree ought to stand all the world over, as it does in Europe, for research, and among our higher universities, as appears from the table on pages 12, 13, there is a practical uniformity in this requirement. Many universities, however, confer the degree after merely an examination on reading pursued *in absentia*, or on studies pursued in residence. Many institutions, moreover (31 in the Report of the Commissioner of Education for 1888-89), give honorary Ph.D. degrees. Such practices make foreigners suspicious of the significance of our higher degrees.

We ask that the Doctor's degree be given only to persons competent to advance knowledge in some department and trained as resident graduates in some university of high rank.

While seeing the advantages of pursuing the sequence of elementary studies planned in any one university, we must recognize the importance to higher education of such frequent migrations on the part of the student as occur in German universities. The scope of the courses at one university is limited by the knowledge and special interests of the instructors there. By receiving instruction from

several teachers at different places, the student gains that breadth of view which is his best preparation for research. On the other hand the teachers gain new ideas and new inspiration from contact with students trained elsewhere. Intermigration is leaven, penetrating and raising the whole lump of higher study. In the absence of intermigrations each university is forced to try to cover the ground completely and instead of an effective division of labor, the announcements of many departments show a dreary uniformity, and an absence of special, advanced courses, for which the instructors have no time.

We do not forget the compensating advantages of long residence at one centre of study and research. It is a question how far a conservative regard for these should control university legislation. But in view of the importance of student migration, to students and instructors alike, we believe it ought to be encouraged. While we are not ready to ask outright that the required time of residence at any particular university be reduced to one year, we should welcome the discussion of this and similar changes. Most of the more advanced universities do, indeed, confer degrees upon properly qualified students who have spent the last year in residence with them ; but there are several important exceptions, as appears from our table.

With the advance of graduate work, we look for a development of the spirit of coöperation between American universities. Meanwhile, to the accomplishment of the reforms suggested above we purpose to devote our best energies.

[Approved by the Committees on the Handbook appointed by the affiliated Graduate Clubs.]

INTRODUCTION.

BRYN MAWR COLLEGE.

Founded in 1880 with the endowment of Dr. Joseph W. Taylor of New Jersey, who proposed to establish an institution of learning for the "advanced education" of women. A President and a Dean of the Faculty were elected in the spring of 1884, a careful study of the domestic organization of other women's colleges was made, and the system of major and minor electives in fixed combination was adopted from Johns Hopkins. The college opened in the fall of 1885 with 54 students. — Three classes of students are admitted: graduate students, undergraduate students, and hearers. The hearers are not recognized by the college, attend courses on the consent of the instructor and receive certificates of study from him only. Graduate students must have a diploma from a college of good standing, may pursue the graduate courses offered, and are entitled to personal guidance from their instructors. — The year is divided into semesters, beginning Oct. 3, 1893, and Feb. 3, 1894. — Resident Graduates, 35; Undergraduates, 163. Professors and Associates, 20; Readers, Instructors, Demonstrators, 9. — President, J. E. RHOADS; Secretary, JULIA COPE, Bryn Mawr, Pa.

UNIVERSITY OF CHICAGO.

After the old University of Chicago, founded in 1857, had, in 1886, dissolved, Mr. John D. Rockefeller in connection with the American Baptist Education Society took steps, in 1888, towards founding a new University, inasmuch as he offered \$600,000 for such a purpose, provided \$400,000 more should be raised. This condition being soon fulfilled, and land worth \$125,000 having been given by Mr. Marshall Field, a charter was granted to six petitioners, and in 1890 a Board of Trustees with 21 members was chosen. This body consists of three classes, whose terms of office expire in succes-

sive years, their successors being elected by the Board itself. Two-thirds of the trustees and the president of the University shall forever be members of Baptist Churches, but no religious test shall be applied to other persons connected with the University. The trustees may make any by-laws for the control of the University, and the care of its funds; they appoint the president and instructors. The University Council, which consists of the chief administrative officials of the University, directs administrative matters; the University Senate, composed chiefly of the heads of departments of instruction, directs educational matters. The assets of the University, including funds subscribed and those now in hand, exceed \$7,000,000. — The University proper includes the Graduate School and the Divinity School. Admission to the former is granted to graduates of high-grade colleges and to special students under certain conditions. Applications (accompanied by testimonials) are to be addressed to the University examiner. — The year is divided into quarters, beginning on the first of October, January, April, and July. [The summer quarter is omitted in 1893.] — Resident Graduates, 203. Divinity Students, 202; Collegiate Students, 321. Faculty Arts, Sciences, and Literature: Professors, 56; Instructors, Tutors, and Docents, 26; Readers, 9; Assistants, 4. Total of teachers, 95. — President, W. R. HARPER; University Examiner, F. F. ABBOTT, Chicago, Ill.

CLARK UNIVERSITY.

Founded in 1887, through the munificence of a citizen of Worcester, with the aim of promoting independent investigation quite as much as instruction. The management of the University is in the hands of a self-perpetuating corporation of nine members, who appoint officers of the University, fix their compensation, and their tenure of office. The University, which opened, in Oct., 1889, with the five departments of Mathematics, Physics, Chemistry, Biology, and Psychology, is devoted to pure rather than to applied science. It admits only graduate students upon satisfactory testimonials. — Students, 53; Fellows, 18. Professors, 5; Instructors and Lecturers, 4. — President, G. STANLEY HALL, Worcester, Mass.

COLUMBIA COLLEGE.

Founded in 1754, in New York City, by a charter from George II., King of England. Originally called "Kings College," its name became changed to "Columbia College" after the Declaration of Independence and the confirmation of its charter by the State of New York. Reorganized in 1890 after the pattern of the German Universities, with the five University Faculties (in addition to the School of Arts) of the School of Law, College of Physicians and Surgeons, School of Mines, School of Political Science, and School of Philosophy, to which has recently been added the School of Pure Science. — Columbia College is an autonomous corporation, with large private funds, managed by a Board of Trustees consisting of 24 members. This Board chooses the President and Professors for life or good behavior. The oversight of the plan of instruction and the lectures, the maintenance of discipline, the awarding of degrees and honors, devolves upon the President, the University Council (consisting of the Deans and one other representative from each faculty, elected by all members of the faculty), and the faculties. — The property of Columbia College has the estimated value of \$13,000,000; its expenditure in 1891-92 was \$629,000. — The Faculty of Philosophy has charge of the University courses of instruction and research in philosophy, philology, and letters; with these may be combined certain courses in the Faculties of Law, Political Science, and Pure Science. Students are received either as candidates for degrees, or to pursue special or partial courses. Matriculates must have completed the curriculum of some good college to at least the close of the junior year. Candidates for the degree of Ph.D. from the Faculties of Political Science, Philosophy and Pure Science are required to read at sight Latin, French and German. The courses in the School of Political Science are open to any person who matriculates, but candidates for a degree must have the qualifications of matriculates of the Faculty of Philosophy. First term begins October 2, 1893; second term begins February 12, 1894. — President, SETH LOW; Secretary of the University Council, Professor J. K. REES, New York City.

CORNELL UNIVERSITY.

An Act of Congress in 1862, entitled "the Morrill Land Grant Act," granted to each State 30,000 acres for each Senator and Representative in Congress, on condition that the funds derived from their sale should be devoted to colleges which should aim (without excluding scientific and classical studies) for the higher education of the industrial classes. Cornell University was incorporated by the New York Legislature in 1865, to obtain the 990,000 acres falling to that State; and with the additional endowment by Ezra Cornell of \$500,000 and 200 acres, with useful buildings. It was opened in 1868, its charter providing for the broadest instruction, unsectarianism, economy to students, and the free tuition of one student from each assembly district of the State. Since 1872, female students have been admitted. The University is an autonomous corporation, administered by a Board of 23 Trustees, of which the oldest descendant of Ezra Cornell, the President of the University, and several State Officers, *ex officio*, are members, while of the 15 others, two are annually elected by the Trustees and one by the Alumni. The president and professors are chosen by the Trustees. Its chief funds have been derived from the sale of the land granted, and from several munificent gifts. Its funds now amount to \$9,000,000. In addition to advanced degrees, the University confers baccalaureate degrees in Arts, Philosophy, Letters, Science (including Bachelor of Science in Agriculture), Architecture, Civil Engineering, Mechanical and Electrical Engineering, and Law.—The year is divided into three terms, beginning September 28, 1893, January 3, 1894, and April 4, 1894, respectively.—Number of Fellows, 18; Graduates, candidates for advanced degrees, 155; Graduates, not candidates for such degrees, 27; Undergraduates, 1340; School of Law, 203. Professors, 67; Instructors, 56; Assistants, 15; Lecturers (in Law), 7; Total of teachers, 145.—President, J. G. SCHURMAN; Registrar and Secretary of the Faculty, G. P. BRISTOL, Ithaca, N.Y.

HARVARD UNIVERSITY.

Harvard College, the oldest of the higher institutions of learning in America, was founded in 1636 by the General Court of Massachusetts Bay voting to give £400. Twelve of the most eminent men of the colony were charged with its organization, "for the training of learned and God-fearing clergy," at "Newetowne," later changed to Cambridge in recognition of the English University where many of the colonists had been educated. In 1638 a young clergyman of Charlestown, John Harvard, a graduate of Cambridge, England, and a former student of Emanuel College, at that University, bequeathed to the college £800 and his library, whereupon it took his name. In 1640, by a legislative enactment, certain officials and clergy of the colony, together with the President of the College, were intrusted, as overseers, with its entire administration. Since, however, the body proved itself too large, the General Court, in 1650, made the College a corporation, consisting of the President, five Fellows, and a Treasurer, with the right of filling its own vacancies. The acts of the corporation became valid only upon the consent of the overseers, but in 1657 (an appendix to the College Charter), the orders and by-laws made by the Corporation were declared to have immediate force and effect, and to be merely "alterable" by the overseers, to whom the corporation was to be responsible. This charter is still in force. In its beginning, the College depended upon the not very liberal financial support of the State. It has received a greater income through the endowments of its grateful alumni and of others who have recognized the value of the institution to the country. The first professorship founded in America was that endowed by Thomas Hollis, a London merchant, in 1721 for Divinity. At the end of the 17th and beginning of the 18th centuries, Harvard College was the centre of the religious conflict in North America. In 1783, the Medical Faculty was established, and in 1817, the Law Department. Under the present administration the institution has made greater progress than ever before, and has developed into a University which now consists of the old College, the Scientific School, the Graduate School, and the six professional

schools of Divinity, Law, Medicine, Veterinary Medicine, Dentistry, and Horticulture. The four latter are located in Boston. — Harvard University is an autonomous corporation, consisting of the President, five Fellows, and the Treasurer, with a Board of Overseers (32 members, including the President and Treasurer, *ex officio*). Five overseers retire annually from office, and are replaced through election by the Alumni. The Professors are appointed by the corporation, without express limitation of time. — The amount expended by the University in 1891-92 was \$978,881.92. — Harvard College, the Lawrence Scientific School, and the Graduate School, are under the charge of one Faculty (Faculty of Arts and Sciences). The other Schools have their separate Faculties. At the head of each Faculty stands the Dean. — Applications for admission to the Graduate School are received at any time ; preferably at the beginning of the Academic year. Graduates of high-grade colleges and scientific schools, and other persons by special vote, are admitted on satisfactory evidence of qualifications. Holders of travelling fellowships, and some others who have already completed a period of residence, are registered as non-resident students. — The year is divided into two terms, beginning September 28, 1893, and February 12, 1894, respectively. — Number of Resident Graduates, 199 ; Non-resident, 16 ; Undergraduates, 1779 ; other departments, 984. Professors, 114 ; Instructors, 102 ; Demonstrators and Assistants, 68 ; Lecturers, 10 ; Total of teachers, 294. — President, C. W. ELIOT ; Secretary, FRANK BOLLES, Cambridge, Mass.

JOHNS HOPKINS UNIVERSITY.

Founded through the munificence of a citizen of Baltimore, Johns Hopkins, who gave over \$3,000,000 to establish the University, and an equal amount for a hospital. The University became established under the laws of Maryland by the charter of 1867 ; in 1870 the Trustees met and elected their President and Secretary. The President of the University was chosen in 1874. Lectures were first delivered in 1876. The Trustees are the ultimate source of authority in all matters pertaining to the University. The President of the University is *ex officio* a member of the Board, and mediates

between it and the Faculty. The Academic Council of the Faculty guides the various departments of study, and selects the Fellows. President, Faculty, and Academic Council are appointed by the Board of Trustees. "The Board of University Studies" arranges the courses for graduates, and the examinations of the candidates for the doctorate.—The expenditure of the University in 1890-91 was \$170,000.—The University provides "collegiate" and "university" instruction. University instruction is offered to advanced and graduate students, whether candidates for a degree or not. They are admitted to courses after consulting with the instructor. The proximity to Washington affords access to unusually large libraries and museums.—Number of Graduates (including Fellows, and students in medical courses), 347; Undergraduates and specials, over 200. Professors and Associates, 44; Instructors and Assistants, 10; Lecturers, 11.—President, D. C. GILMAN; Secretary of Board of University Studies, G. H. EMMOTT; Registrar, T. R. BALL, Baltimore, Md.

UNIVERSITY OF MICHIGAN.

Founded in 1837, by an Act of Legislature, as a part of the public instruction. Its government was at first vested in a Board of Regents, appointed by the Governor of the State, with the consent of the Senate, several State officers being *ex officio* members. The Regents enacted laws, appointed and removed professors, fixed salaries, and regulated courses of instruction. It was likewise provided that the admission fee should never exceed \$10, and that tuition should be entirely free to residents of the State. The Governor was made *ex officio* President of the Board. It was enacted that the University should consist of the three departments, of literature, science, and the arts; of law; and of medicine. The first of these departments opened in 1841; that of medicine in 1850; that of law in 1859. In 1852, by amendment of the State Constitution, the Regents became elected by the people, and they elected a President to be the principal executive officer of the University, the Board retaining a general supervision and a control of all expendi-

tures. At present there are eight Regents, two of whom are elected biannually, holding office for eight years. In addition to the three departments mentioned above, the University consists of the School of Pharmacy, and of the Homœopathic and the Dental Colleges. The Professors of all the faculties constitute the University Senate, which considers all questions of general interest. The income of the University is derived from its fund coming chiefly from the sale of State land, from a State tax, and from tuition fees. Its expenditure in 1890-91 was \$347,255.93.—The Graduate School was established in 1892 in connection with the Faculty of Literature, Science, and the Arts. It is under the special government of the "Academic Council," consisting at present of all the heads of the departments. It is open to graduates of high-class colleges who wish to become candidates for a higher degree, and also for those who do not. Applications (with credentials) are to be made to the President. Students pursue three lines of study—one major and two minor. The year is divided into semesters of which the first begins October 1, 1893; the second, February 19, 1894.—Number of Resident Graduates (in Academic Faculty only), 65; Non-residents, 44; Undergraduates, 1375; other departments, 1317.—Profes., 70; Lects. and Insts., 44; Demonsts. and Assts., 33. Pres., J. B. ANGELL; Registrar, Prof. P. R. DE PONT, Ann Arbor, Mich.

UNIVERSITY OF PENNSYLVANIA.

Founded in 1740, through the influence of Benjamin Franklin, by a number of citizens of Philadelphia, as an Academy, with an English, a Mathematical, and a Latin School. This was so successful, that its Trustees obtained a charter from Thomas and Richard Penn, the governors, and two years later the right to confer Academic degrees. An alleged attempt to restrict the freedom of opinion required in the charter, gave the State Legislature the pretext, in 1779, for confiscating the properties of the College, and bestowing them upon "The University of the State of Pennsylvania." The new and the old institutions were, in 1791, amalgamated under the present name, under the control of a Board of Trustees, consisting of 24 members, including the Governor of the State as President.—

The University comprises the College Department, the Department of Philosophy (Graduate Department), and six professional schools. Total number of Professors, Lecturers, and Instructors, 255; total number of students, 2055.

The Department of Philosophy is open to both sexes. The year begins September 29, 1893. Candidates must matriculate on or before the second Friday in October. Degrees may be granted at any time during the college year. Students not candidates for a degree may be admitted as "special students." Matriculates, 78; Special Students, 39; total, 117. Faculty of the Department of Philosophy, 31; other instructors, 12; total, 43.—Provost of the University, WILLIAM PEPPER; Dean of the Department of Philosophy, HORACE JAYNE, University of Pennsylvania, Philadelphia, Pa.

PRINCETON.

(College of New Jersey).

Founded in 1746, through the influence of Dr. Dickinson and others, by a charter from the Governor, John Hamilton. In 1748, a second and more ample charter was granted by Governor Belcher, and this, after the Revolution, was confirmed and renewed by the State Legislature. The corporation is a Board of Trustees, who hold and administer the property of the College, make laws for its government, choose its President and Faculty, and confer degrees. This Board is self-perpetuating, composed of 27 members, with the Governor of the State as President *ex officio*. The John C. Green School of Science was established in 1873, and offers courses in Natural Sciences and Technology, some of which are intended for graduates. Every Instructor in the College may, with the leave of the Faculty, give instruction to graduates. "He shall meet with his class for at least one hour a week, and not more than three hours a week during the Academic year."—The year is divided into two terms of eighteen weeks each, beginning September 20, 1893, and February 8, 1894, respectively.—Number of Resident Graduate Students (including Fellows), 120; Non-residents, 10; Undergraduates, 945. Professors, 42; Instructors and Assistants, 22.—President, F. L. PATTON; Registrar, H. N. VAN DYKE, Princeton, N.J.

YALE UNIVERSITY.

Founded in 1701, through the influence of ten clergymen, by a charter from the General Court of Connecticut, which created a Board of Trustees, all of whom were to be clergymen. The Court endowed this College of Connecticut with an annual grant, and the State continued up to the present century to appropriate funds for its support. Located temporarily at Saybrook, it was permanently established at New Haven in 1716, and named after Elihu Yale, who had donated £400. The University is an autonomous corporation, under the control of a Board of Trustees, composed of ten Congregational clergymen of the State of Connecticut, the Governor and Lieutenant-Governor of the State *ex officio*, six Alumni (chosen by vote of all the Alumni), and the President, who is *ex officio* President of each Faculty. The University comprises (1) the Department of Philosophy and the Arts, including the courses for Graduate Instruction, Yale College, Sheffield Scientific School (begun in 1847), and the Art School; (2) Divinity School; (3) Medical School; (4) Law School. — The University funds amounted, in 1892, to \$1,163,000, the Academic fund to \$1,384,000, those of the Theological Department to \$548,000, of the Sheffield Scientific School to \$319,000, of the Medical Department to \$42,000, of the Law Department to \$74,000, of the Art School to \$91,000, and the Loomis fund \$398,000. Expenditure for 1891-2, \$520,246.13. — Graduates of colleges, of both sexes, are received with or without reference to the attainment of a higher degree. — The year is divided into two terms, beginning September 28, 1893, and January 9, 1894, respectively. — Number of Students in Graduate Courses, 125; Undergraduates, 1458; other Departments, 394. Professors, 83; Instructors, 43; Assistants and Demonstrators, 26; Lecturers, 20. — President, Rev. TIMOTHY DWIGHT; Dean of the Graduate Department, Professor A. T. HADLEY, New Haven, Conn.

COURSES FOR WOMEN.

Of the Universities whose graduate courses are given in this book, one, *Bryn Mawr*, admits only women ; three, *Chicago*, *Cornell*, *Michigan*, admit men and women on precisely similar terms to all departments of the University ; and one, *Yale*, admits without distinction of sex to the Graduate Courses. In the *Univ. of Pennsylvania*, advanced instruction is given in the "Graduate Department for Women," which offers all the courses that the University Faculty of Philosophy does. It has a separate Board of Managers, and offers 8 Fellowships, entitling the holder to all the privileges of tuition and residence. Application for further information should be made to IDA WOOD, Ph.D., Sec. Grad. Dept. for Women, U. of Penn., Phila. Some of the advanced courses at *Harvard* are given every year, to women precisely as to men, through the Society for the Collegiate Instruction of Women, "Harvard Annex." Such courses offered for 1893-4 are preceded in this book by a † in the list of courses given at Harvard. Further information may be had from Mr. ARTHUR GILMAN, Sec., Cambridge, Mass. At *Columbia* the Register of Students in the School of Political Science contains the names of women, and that of the University Faculty of Philosophy, women in attendance at Barnard College.

UNIVERSITY.	No. GRAD. STUDENTS, 1892-3.		No. ADV. DEGREES, 1892.		REQUIREMENTS FOR PH.D. DEGREE.		
	Res.	Non-Res.	A.M. etc.	Ph.D. etc.	Min. req. time.	Min. req. res.	THESIS.
Bryn Mawr	35	0	1	1	3 yrs.	2 yrs.	Research. Must be printed.
Chicago.	203	11	—	—	3 yrs.	1½ yrs.	Research. Must be printed.
Clark	53	0	0	7	3 yrs.	1 yr.	Research. Must be printed.
Columbia	84	0	27	0	2 yrs.	—	Research. Must be printed.
Cornell.	173	—	14	8	2 yrs.	1 yr.	Research. Must be printed.
Harvard	199	16	97	6	2 yrs.	2 yrs.	Research. Not necessarily printed.
Johns Hopkins . .	347	0	0	37	3 yrs.	1 yr.	Research. Must be printed.
Michigan	66	44	11	7	—	1 yr.	Research. Must be printed.
Pennsylvania . .	117	0	7	5	2 yrs.	1 yr.	No mention of thesis. Degree given on exam.
Princeton	120	10	53	4	2 yrs.	1 yr.	Research. Must be printed.
Yale	125	0	8	13	2 yrs.	2 yrs.	Must show high attainment.

FEES.	FELLOWSHIPS AND SCHOLARSHIPS.		SIZE OF LIBRARY.	
	NUMBER.	ANN. VALUE.	BOOKS.	PAMPH.
\$100 + Lab. fees.	9 Dept. Fell. 2 Schol. (for Friends)	\$525 \$200	11,400	—
\$35 per quarter, \$5 incidentals.	20 Fell. 20 Schol.	\$520 \$320	200,000 (est.)	
\$200.	10 Fell. 10 Fell. 10 Schol.	\$600 \$400 \$200	15,500	1,500
\$150, or \$15 per ann. for each hour per week. \$35, Grad. fee.	24 Fell. 1 Fell. in <i>Physics</i> Several free or reduced tuitions.	{ \$500 and no tuition fees	160,000	—
\$10, Grad. fee.	8 gen. } Fell. 10 spec. } 6 Schol.	\$400-\$500 \$200	113,000	25,000
\$150 + Lab. fees, or \$45 per course.	17 gen. } Fell. 5 spec. } 28 Schol. 20 Schol.	\$750-\$500 \$300-\$200 \$150	409,400	400,000 (est.)
\$150; \$5, Registration fee; \$10, Grad. fee.	20 Fell. 20 Schol. 30 Schol. for res. of } Va. and N.C. only }	\$500 \$200 \$225-\$150	60,000	40,000
\$25, Matric. fee, non-res. of State. \$10, Matric. fee, res. of State. \$30, Ann. fee, non-res. of State. \$20, Ann. fee, res. of State.	1 Fell. in <i>Classics</i>	\$500	82,000	16,000
\$150, or \$15 per ann. for each hour per week. \$5, Matric. fee. \$25, Grad. fee.	1 Fell. in <i>Physics</i> 5 Fell. in <i>Economics</i>	\$600 Free tuition	110,000	Over 110,000
\$40, Matric. fee. \$25, Ann. fee. \$50, Grad. fee.	8 spec. Fell.	\$600-\$200	107,000	25,000
\$100 ±.	5 Fell. 20 Schol.	\$400 \$100	200,000	100,000+

EXPLANATION OF LISTS OF GRADUATE COURSES.

In the notes, following *Lib. contains*, or otherwise, are frequently given special collections of books. These were gathered from the Bibliographical Contributions of the Harvard University Library, No. 45, 1892. In some cases, by special request, such notes have been omitted.

Special funds open to students of the department are also given.

From some of the Universities, notably Chicago, information on the above two points was not obtained.

Following the instructor's name are usually (1) his highest degree and present position ; (2) previous positions held and journals edited ; and (3) subjects upon which he has published. These items are separated by dashes. One or more may be omitted.

Following the brief title of the course are given the number of hours per week and number of weeks of appointment with instructor. Unless the months are given, the course usually extends from October to May (inclusive).

- L Number of hours laboratory work.
- * Course open also to undergraduates.
- ? Doubt as to whether course will be given.
- † (In Harvard) Course given also in Annex.
- lab. Laboratory work (indefinite).
- fort. Fortnightly.

The names of the months have been abbreviated as follows : Ja., F., Mr., A., My., Ju., Jul., Au., S., O., N., D.

I. LANGUAGE AND LITERATURE.

1. SEMITIC LANGUAGES AND LITERATURES.

[Including Semitic History and Biblical Literature.]

BRYN MAWR.

Semitic Library of A. Amiard, of Paris.

GEORGE A. BARTON,

Ph.D., Harvard, 1891; Assoc. in Bibl. Lit. and Semit. Lang. — Harvard, '89-91.

- *Hebrew, 2, 30.
- Aramaic, incl. Syriac and Eibl. Aramaic. 2, 30.
- Assyrian. 2, 30.
- Patristic Greek, esp. sub-apostolic lit. 2, 30.
- Hist. of Israel. 2, 30.
- Hist. and progress of relig. ideas in Israel, and N.T. relig. ideas. 2, 30.
- Cuneiform inscript. and O. T. 1, 30.
- Hist. Spanish and Bagdad Califates. 1, 30.
- N. T. Greek. 2, 30.
- Origin and contents of books of Bible. 2, 15, F.-My.
- Seminary, fort.

CHICAGO.

W. R. HARPER,

Ph.D., Yale, 1875; President of Univ., Head Prof. Semitic Langs. and Lits. — Prof. Hebrew and Cognate Langs., Baptist Union Theol. Sem., '79-86; Principal Chautauqua System since '91; Prof. Semitic, Yale, '86-91; Woolsey Prof. Biblical Lit., Yale, '89-91; Ed. *Old and New Test. Student and Hebraica*.

- Hebrew lang. 5, 12, A.-Ju.
- Minor proph. of Assy. per. 10, 6, Ja. F.
- Arabic geog., hist., and commentary. 10, 6, N. D.
- Phoenician. 5, 6, Ja. F.
- Adv. Hebr. gram. 5, 6 Au. S.
- Adv. Hebr. gram. 5, 6, F. Mr.
- Comp. Semitic gram. (adv.) 5, 6, F. Mr.
- O. T. legal lit. 10, 6, My. Ju.
- Arabic lang. 4, 6, N. D.

Earlier Suras of Kuran. 4, 6, O. N.
Hexatuchal anal. 4, 6, Ja. F.

E. G. HIRSCH,

Ph.D., Leipzig, 1876; Prof. Rabbinical Lit. and Philos. — U. of Penn., Leipzig, '76. — Minister, '77-81. Ed. *Zeitgeist*, '80-7, and *Reformer*, '86.

- Jerusalem Talmud. 4, 6, O. N.
- One thousand and one nights. 4, 6, O. N.
- Portions of Babyl. Talmud. 4, 6, N. D.
- Gram. Talmudic dialects. 4, 6, N. D.
- Job, Peshitta, Targum. 4, 6, Ja. F.
- Mishna. 4, 6, Ja. F.
- Coptic. 4, 6, F. Mr.
- N. T. and Talmud. comment. 4, 6, F. Mr.
- Jewish sects. 4, 6, A. My.
- Syriac (adv.). 4, 6, A. My.
- Maimonides. 4, 6, My. Ju.
- Adv. Syriac. 4, 6, My. Ju.

E. D. BURTON,

A.B.; Prof. New Testament Lit. and Exegesis. — Rochester Theol. Sem., 1879-82; Leipzig, '87. — Instr. N. T. Greek, Rochester Theol. Sem., '82-3; Assoc., Prof. Newton Theol. Inst., '83-6; Prof. N. T. Interpret. ibid. '86-92; Asst. Ed. *Biblical World*. — Moods and tenses in N. T. Greek, study of N. T. works, life of Jesus.

- Studies in apostol-fathers. 5, 6, Au. S.

I. M. PRICE,

Ph.D., Leipzig, 1887; Assoc. Prof. Semit. Langs. and Lits. — Bapt. Union Theol. Sem., B.D., '82; Leipzig. — Prof. in Hebrew and Cognate Langs., Baptist Union Theol. Sem. '88-92. — Assoc. Ed.: *Biblical World* and *Hebraica* — O. T. hist. inscriptions.

- Isaiah: chaps. i.-xxxix. 5, 6, Ja. F.
- Bi-lingual Babyl. psalm lit. 5, 6, O. N.

Chicago—Continued.

Biblical Aramaic. 5, 6, F. Mr.
 Isaiah: chaps. xl.—lxvi. 5, 6, Jul. Au.
 Spec. introd. O. T. 5, 12, O.-D.
 Heb. lang. 10, 6, Ja. F.
 Heb. lang. 10, 6, Ju. Jul.
 Comp. lexical study No. Semit. langs.
 5, 6, A. My.
 Mod. discov. and O. T. 5, 6, A. My.

G. S. GOODSPEED [See also 10],

Ph.D., Yale, 1891; Assoc. Prof. Comp.
 Relig. and Anc. Hist.—Yale, Freiburg,
 '91-2.—Asst. in Semitic, Yale, '88-91.

Hist. Babylon and Assy. 4, 6,
 My. Ju.
 Relat. Heb. and Egypt. hist. 4, 6,
 Jul. Au.
 Relat. Heb. and Bab.-Assyr. hist.
 4, 6, Au. S.
 Biblical hist. 4, 6, Ja. F.

R. F. HARPER,

Ph.D., Leipzig, 1886; Assoc. Prof. Semitic
 Langs. and Litt.—Instr. in Semitic, Yale,
 '87-8; '89-91; Assyriologist, Exposit. Baby-
 lon. Explor. Fund (U. of Penn.) '88-9.

Hist. Hebrew. 5, 6, Jul. Au.
 Hosea. 5, 6, Au. S.
 Assyrian lang. 5, 12, Jul.-S.
 Assyrian lang. 5, 12, Ja.-Mr.
 Assyr. syllabaries and Mythol. in-
 scription. 5, 12, Ja.-Mr.
 Early Assyr. hist. inscription. 5, 12,
 A.-Ju.
 Babylon hist. inscription. 4, 12, Jul.-S.
 Beginning Syriac. 5, 12, Ja.-Mr.
 Assyr. and Babyl. life. 4, 6, A. My.
 Mesopotamian geog. 5, 6, My. Ju.

C. E. CRANDALL,

Ph.D., Yale, 1891; Univ. Exten. Instr.
 Semitic Langs.—Bapt. Union Theol. Sem.,
 B.D. '85.—Assist. Semitic, Yale, '89-91.

Hist., Hebrew. 5, 6, F. Mr.
 Hist. Hebrew. 5, 6, Au. S.
 Sight transl. Heb. 5, 24, O.-Mr.
 Books of Chronicles. 5, 6, N. D.

T. H. ROOT,

B.D., Yale, 1890, A.M., Harvard, '91; Tutor
 in N. T. Lit.

- *Rapid transl. Greek text of N. T.
 4, 6, A. My.
- *Rapid reading Hellenistic Gk. 4,
 12, O.-D.

C. W. VOTAW,

B.D., Yale, 1891; A.M., Amherst, '92;
 Docent in Biblical Lit., Yale, '88-91; Chicago
 '92-3;—Instr. N. T. Greek, Am. Inst. Sac.
 Lit., '91-2.—Founding of Christian Church.

N. T. Greek. 4, 6, A. My.
 Sources and relations of four gos-
 pels. 4, 6, My. Ju.
 Distinctive features of 4th gosp. 4,
 6, Au. S.
 Paul's Corinthian epist. 4, 6, N. D.

C. F. KENT.

Apocryphal wisdom lit. 4, 12, Ja.-
 Mr.

COLUMBIA.

*Various courses at the Union Theological Semi-
 nary are open to students, namely, in N. T.
 Greek, 8 courses, 1-2 h., by Prof. Vincent;
 in Semitic, 17 courses, 1-2 h., by Profs. F.
 Brown, Briggs, and Mr. Fagnani; in
 Church Hist., 5 courses, 2 h., by Mr. W. A.
 Brown.*

RICHARD J. H. GOTTHEIL,

Ph.D.; Prof. Rabbin. Lit. and Semit. Lang.

- *Bibl. Heb. (el.) 2, 30.
- *" " (adv.) 2, 30.
- *Rabbin. Heb., Mishna. 1½, 30.
- *" " Mediaeval Heb. phi-
 los. 1½, 30.
- Semitic epigraphy.
- *Assyrian. 2, 30.
- *Arabic (el.) 3, O.-Ja., 1, F.-My.
 " (adv.) 1½, 30.
- *Arabic, Interpretation of Qur'an and
 of Noldeke's Delectus. 1½, 30.
- *Syriac. 2, 30.
- Seminary: Egyptian dialect of mod.
 Arabic. 1, 30.

C. H. YOUNG,

Ph.D., Columbia; Instr. in Greek.—Co-
 lumbia, 1888-91; Am. School, Athens, '91-2.

- *N. T. epistles. 1, 30.
- *N. T. Gospels and Acts. 1, 30.

HARVARD.

*Semitic conference meets twice monthly. Special
 Semitic Library, gift of J. H. Schiff. Se-
 mitic museum contains large collection of
 monuments, tablets, seals, coins, and photo-
 graphs, providing means of original re-
 search.*

CRAWFORD H. TOY,

A.M., Virginia, 1856; Hancock Professor of Hebrew and other Oriental Languages. — Berlin, '66-8. — Prof. So. Baptist Theolog. Sem., '66-79; — Prof. Harvard, '80-pr. — Semitic Grammar, Religion of O. T., Quotations from O. T. in N. T.

- *Hist. of prechristian Heb. lit. 4, 16, O.-Ja.
- *Hist. Heb. relig., compared with other Semitic relig. 2, 31.
- *Hist. Spanish Califate. 1, 31.
- Hebrew (adv.). 2, 31.
- Arabic. 2-3, 31.
- Arabic (adv.). 2, 31.
- Ethiopic. 1, 31.
- General Semitic gram. (research).
- Kitāb al- Agāni (research).

DAVID G. LYON,

Ph.D., Leipzig, 1882; Hollis Professor of Divinity. — Leipzig, '79-82. — Prof., Harvard, '82-pr.; Record. Sec., Am. Oriental Soc., '86-pr. — Assyrian Lang. and Relig., Hebrew Hist.

- †*Hebrew (el.). 3, 31.
- *Babylonian-Assyr. hist. 1, 31.
- †*History of Israel. 2, 31.
- Classical Aramaic. 2, 16, O.-Ja.
- Jewish Aramaic. 2, 15, F.-My.
- Assyrian (el.). 2, 31.
- Assyrian (adv.). 2, 31.
- Assyrian grammar (research).

JOHNS HOPKINS.

PAUL HAUPT,

Ph.D., Leipzig, 1878; Prof. of the Semitic Languages. — Leipzig, '76-79; Berlin, '79-80. — Privatdoc. — Göttingen, '80, and Prof. of Assyriology in the same, '83; Hon. curator of coll. Oriental Antiq. in U.S. Nat. Mus.; Co-editor of *Contributions to Assyriology and Comp. Semitic Philology*, and of *Assyriological Library*. — Oriental History and Archaeology, Comp. Semitic philol., O. T. Exegesis, biblical criticism, Assyrian grammar, cuneiform texts.

- Introd. to lit. O. T. 1, 15, O.-Ja.
- Cuneiform inscripts. and O. T. 1, 15, F.-My.
- Hebrew (el.) 1, 30.
- Crit. interpret. book of Job. 1, 30.
- Prose comp. in Heb., Assyrian, Arabic. 1, 30.
- Assyrian Seminary. 2, 30.

C. ADLER,

Ph.D., Johns Hopkins, 1887; Assoc. in Semitic Langs.

- Jewish governmental and civic institutions. 1, 15, O.-Ja.
- Babylonian life and hist. 1, 15, F.-My.
- Post-biblic. Hebrew. 1, 30.
- Ethiopic (el.). 1, 30.

C. JOHNSTON,

A.M., Virginia, 1879; M.D., U. of Md., '80; Instr. Semitic Langs.

- Reading Heb. at sight. 1, 30.
- Assyrian (el.). 2, 30.
- Assyrian; selected hist. inscriptions. 2, 30.
- Arabic (el.). 1, 30.
- Interp. select. Arabic texts. 1, 30.
- Syriac (el.). 1, 30.

MICHIGAN.

W. M. ARNOLT,

Ph.D.; Asst. Prof. Oriental Langs.

- Beginner's course in Heb.
- Select. from Genesis. 2, 17, F.-My.
- Selected Psalms; Heb. syntax. 2, 17, F.-My.

C. W. BELSER,

Ph.D.; Asst. Prof. Oriental Langs.

[Courses given in 1892-3.]

- The Psalms. 2, 17, O.-Ja.
- Quot. from O. T. in N. T. 1, 17, O.-Ja.
- Isaiah i-xxxix; exegesis and crit. 2, 17, F.-My.
- Books of Samuel in Heb. and Gr. 2, 17, F.-My.
- Assyrian (el.). 2, 17, O.-Ja.
- Assyrian (adv.). 2, 17, F.-My.
- Arabic (el.). 2, 17, O.-Ja.
- Arabic gram. and comp. F.-My.
- Semitic palæog. and inscriptions. 1, 17, O.-Ja.
- Intr. comp. Semitic gram. 1, 17, F.-My.

PENNSYLVANIA.

Lib. of Arabic Lit., 1000 vols. and 20 vols. MSS.

JOHN P. PETERS,

Ph.D.; Prof. of Hebrew.

[Courses offered in 1892-3.]

Comp. Hebrew gram. (adv.). 1, 30.

Heb. lyric poetry. 2, 30.

Geog. and archæol. of O. T. 1, 30.

Quest. in relig. and hist. of Hebrews.
1, 30.

Pentateuchal study (sem.).

HERMANN V. HILPRECHT,

Ph.D., Erlangen, 1885; Prof. of Assyrian and Curator of Babylonian Museum.—Leipzig and Erlangen, '80-5.—Prof. Classic Lang. in "Fridericum," Davos, Switzerland, '84-5; Repetent Theol. Fac., Erlangen, '85-6; Prof. O. T. Lang. and Theol., Smith Sem., Mt. Airy, Philadelphia; Ed. *S. S. Times* and *Lutheran Church Rev.* '86-pr.—"Freibrief Nebukadnezar's I.," "Die Annalen Sanheribs," "Babylon," Babylonian inscriptions, Paul Gerhardt, various theolog. and Assyriolog. papers.

Assyrian grammar. 2, 30.

Historical Assyrian texts. 2, 30.

MORRIS JASTROW, JR.,

Ph.D., Leipzig, 1884; Prof. Semitic Langs.—Breslau, '81-4; Berlin, '84; Paris, '84-5; Strassburg, '85.—also Asst. Lib. U. of Penn.—Grammat. works of Abn Zakariija Chajing; Babylonian, Phœnician, Assyrian Langs.

Arabic gram. (el.). 2, 30.

Chapters from Koran. 1, 30.

Ibn Hisham's life of Mohammed.
1, 30.

El. Hebrew gram. 2, 30.

Philol. study Book of Lamentations.
1, 30.

Book of Judges.

Syriac gram. (el.). 1, 30.

Rabbinical Treatise Pirkê Aboth.

Phœnician incripts. from Corp. Inscript. Semiticarum. 1, 30.

PRINCETON.

Courses in Assyrian, Arabic, Syriac, Ethiopic, given in the Theol. School by Dr. Davis, Dr. Vos and Mr. Martin, are open to graduates.

CHALMERS MARTIN,

A.M.; Instr. in Hebrew.—Princeton Theol. Sem., '79-83.—Asst. in O. T. Dept., Princeton Theol. Sem.

Hebrew gram. (el.). 4, 32.

YALE.

Five courses (1-2 h.) by Prof. Curtis, in the Theolog. Sem., on critical studies of parts of the Bible, are open to Graduates on consent of instructor. Oriental library of 4,000 vols. and 90 Arabic MSS.

E. L. CURTIS,

Ph.D., Hanover Coll., 1886; Holmes Prof. Heb. Lang. and Lit.—Formerly Prof. O. T. Lit. and Exegesis, McCormick Theol. Sem.—O. T. lit., esp. prophecy.

*Book of Isaiah (Engl.). 1, 32.

FRANK K. SANDERS,

Ph.D., Yale, 1880; Asst. Prof. Biblical Lit. and Instr. in Semit. Lang.—Yale, '86-9. Vice-Principal Am. Inst. Sacred Lit., '91-pr.—Postexilic Hist., O. T. Wisdom Lit.

*O. T. lit. (English). 2, 32.

Arabic poetical lit. 2, 32.

Assyrian hist. inscriptions. 2, 32.

Assyrio-Babl. lit. and hist. 2, 32.

Comp. Semitic grammar. 2, 32.

*Beginning Hebrew (el.). 4, 12, O.-D.

* " " (adv.). 4, 20.

*Early Hebrew poetry. 2, 12.

*Hebrew law, history, and prophecy.
2, 20.

Sight reading in Hebrew. 2, 32.

Biblical Aramaic. 2, 20.

Beginning Arabic. 2, 32.

Beginning Assyrian. 2, 32.

2. INDO-IRANIAN LANGUAGES AND LITERATURES.

[See also 7, Comparative Language and Literature.]

BRYN MAWR.

EDWARD W. HOPKINS,

Ph.D., Leipzig, 1881; Prof. of Greek, Sanskrit, and Comparative Philology. — Leipzig, '78-81; Berlin, '80; Sorbonne, Collège de France, '81. — Asst. in Latin and Instr. in Zend, Columbia, '81-4.

*Beginners' Sanskrit. 1, 30.
Rig Veda.

CHICAGO.

CARL D. BUCK [see also 7],

Ph.D., Yale, 1889; Asst. Prof. Sanskrit and Comp. Philology. — Yale, '86-7; Am. School at Athens, '87-9; Leipzig, '89-92. — Phonological Notes, esp. on Greek, Latin, Sanskrit, and Avestan.

Sanskrit (el.). 4, 36, O.-Jun.
Sanskrit (el.). 4, 36, Jul.-S.
Avestan (Zend). 4, 12, A.-Jun.

COLUMBIA.

EDWARD D. PERRY,

Ph.D., Tübingen, 1879; Prof. of Sanskrit. — Leipzig, '76-8; Tübingen, '78-9. — Tutor in Greek and Instr. in Sanskrit, Columbia, '80-91. — Indra in the Rig Veda, Sanskrit Primer.

Sanskrit (el.), [with Prof. Jackson]. 2, 30.
Sanskrit (adv.), Kālidāsa's Meghadūta, Introd. to Veda. 2, 30.
Pali (el.). 1, 15, O.-Ja.
Avestan (el.), [with Prof. Jackson]. 2, 15, O.-Ja.

A. V. WILLIAMS JACKSON,

Ph.D., Columbia, 1886; Adj. Prof. of English Lang. and Lit., and Instr. in the Iranian Lang. — Columbia, '83-6; Halle, '87-9. — Lecturer on Mazdean Religion at Harvard, '92. — A Hymn of Zoroaster, Yasna 31; Avestan Alphabet and its Transcriptions; An Avestan Grammar in comparison with Sanskrit.

Avestan (el.). 2, 15, F.-My.
Avestan (adv.). 2, 30.
Old Persian inscriptions. 1, 15, O.-Ja.
Pahlavi. 1, F.-My.

CORNELL.

B. I. WHEELER [see 3],

Interpretation of Rig Veda. 2, 24,
O.-Mr.

G. P. BRISTOL [see 3],

Sanskrit (el.). 2, 32.

HARVARD.

Besides numerous works on the literature and antiquities of India, the Univ. possesses nearly 1000 manuscripts of Sanskrit and Prakrit texts, — the largest collection in America.

CHARLES R. LANMAN [see also 7],

Ph.D., Yale, 1873; Prof. of Sanskrit. — Yale, '71-3; Berlin, '73-4; Tübingen, '74-5; Leipzig, '75-6. — Sec. Am. Philolog. Ass., '79-84; ed. its Transactions, Vols. X.-XIV.; Pres. of same, '89-90; Cor. Sec. Am. Oriental Soc., '84-pr.; Fellow and Assoc. at Johns Hopkins, '76-80. — Noun Inflection in Veda; Sanskrit Reader, with vocab. and notes; various papers on Oriental philosophy and customs; edits Harvard Oriental Series.

†Sanskrit (el.). 3, 31.

* " (adv.). 3, 15, O.-Ja.

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Cursory Sanskrit reading. 1, 15,
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Ph.D., Johns Hopkins, 1879; Prof. of Sanskrit and Comp. Philology. — Yale, '77-8; Johns Hopkins, '78-9; Berlin and Leipzig, '79-81. — Fellow at Johns Hopkins, '78-9; Associate, '81-3; Assoc. Prof., '83-91. — Director Am. Oriental Soc. — Ed. from MSS.: The Kāucika-sūtra of the Atharva-Veda, and the Gṛhyasamgraha; Interpretation of the Veda, Buddhism, Greek, and Indo-European Grammar.

Vedic Seminary: Atharva-Veda and its acces. lit. 2, 30.

Johns Hopkins—Continued.

Zend and Zend-Avesta. 1, 30.
 Readings in various texts. 2, 15,
 O.-Ja.
 El. of Vedic philol. 2, 15, F.-My.
 Sanskrit; gram. comp. (el.). 2, 30.

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 Çakuntala and the Veda. 2, 30.

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 Old Persian text of Behistûn inscr.
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*Sanskrit gram., reading. 2, 32.
 ?Sanskrit and comp. gram.

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 Ph.D., Breslau, 1861; LL.D., Williams, '68;
 William and Mary, '69; Harvard, '86;
 Edinburgh, '89; Prof. of Sanskrit and
 Comp. Philology. — Nature, origin and
 study of language; Phonology; Sanskrit
 langs. and lits., esp. grammar.
 Sanskrit. 4, 32.

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 Greek, Johns Hopkins, '85-7, and Reader in
 Greek Lit. in same, '87-8. — Greek gram-
 mar and Greek dialects.

Attic tragedy, Æschylus, Aristotle's
 poetics, lectures. 4, 30.

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Ph.D., Johns Hopkins, 1886; Associate in
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 — Prof. of Greek, Davidson Coll., '86-8;
 Am. School of Class. Studies, Athens, '88-9.

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 dramatic lit. 1, 30.

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 Terence, Seneca; study of treat-
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 Miles Gloriosus (sem.). Once fort.

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 syntax: The subord. sentence. 1, 30.

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 '74-6, '77-80; Prof. of Latin, Cornell, '80-
 92; Assoc. Ed. Classical Review; joint-Ed.
 Chicago Stud. in Class. Phil., former joint-
 Ed. Cornell Stud. Class. Phil. — Aims and
 Methods in Class. Phil., Sequence of Tenses
 in Latin *Cum*-constructions, *quod sciam*-
 clause, general condition in Lat., "Compar-
 ative clause," clause of Purpose.

Comp. syntax of the Greek and
 Latin verb (sem.). 2, 30.

Pliny the younger. 4, 12.

Martial. 4, 6.

Juvenal. 4, 12.

*Latin syntax, readings, discuss. 4, 6.

*Teacher's training course. 4, 6.

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 Studies, Athens, '82-3. — Prof. of Greek,
 Bryn Mawr, '85-92.

Hist. ancient philos. (sem.). fort.,
 36, O.-Ju.

Literary criticism and rhetoric of
 ancients (sem.). fort., 30, O.-My.

Greek syntax in sec. sch. (teacher's
 course). 4, 6, Jul. Au.

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Denison; Instr. Latin, '74-6; Prof. Latin
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- *Roman oratory. 4, 12.
- *Epicureans as seen in Cicero's writings. 4, 12.
- *Rom. hist. studied from the sources. 4, 12.
- *Virgil, Georgics. 4, 6.
- *Church Latin. 4, 12.
- *Horace, epistles. 4, 6.
- *Tibullus and Propertius. 4, 6.

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Ph.D., Yale, 1879; Assoc. Prof. of Greek.—
Yale: Tutor in Greek, '76-82; Asst. Prof.
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Director Am. School at Athens, '88-9; Instr.
Greek, Harvard, '89-92.

Greek and Latin archæol. 4, 12,
F.-A.
Greek lyric poets. 4, 12, O.-D.

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Ph.D., Yale, 1891; Assoc. Prof. of Latin.—
Yale, '82-4; Berlin, Bonn, '88-90.—
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quial Latin and letters of Cicero.

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- *Cicero's letters. 4, 12.
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- Roman administration. 4, 12.

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Ph.D., Yale, 1888; Asst. Prof. of Greek.—
Yale, '86-8.—Tutor in Greek, Denison,
'82-6; Prof. Greek, Bucknell, '88-92.

Demosthenes. 4, 12, Ja.—Mr.
Select plays of Sophocles and Euripides. 4, 12, Ja.—Mr.

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Ed. Com. Archæol. Inst. Am. since 1892.—
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'88-90.—Columbia: Tutor in Latin, '84-6;
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nunciation, Dict. of Classic Lit. and Antiq.,
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Cornell — Continued.

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*Lucretius. 3, 15, F.-My.

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Harvard, '91; D.C.L., Oxford, '90; Eliot Prof. of Greek Lit. — Göttingen, Berlin, Bonn. — Dir. Am. School at Athens, '82-3; Ed. (with others) Papers of Am. School at Athens, Vols. I.-IV. — Greek Gram., Antiquities, History, Literature.

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*Hist. Greek lit. 3, 31.

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Ph.D., Cornell, 1885; Acting Prof. of Latin Lang. and Lit. — Cornell, Am. School at Athens, '88-9. — Instr. Latin, Cornell, '82-5; Instr. Greek and Latin, Harvard, '80-90; Asst. Prof. Latin, Michigan, '90-2. — Articles in *Am. Jour. Archaeology* and *Harvard Stud. in Class. Philology*.

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My.

A. F. WEST [see 9].

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bia, '82-4; Athens, '84-5, '92-3.—Notes in
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*Pausanias and rec. excav. in Greece.
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A.M.; Prof. Latin Lang. and Lit.—Berlin,
Bonn, Jena, Sorbonne, 1862-4; '68-9.—
Prof. Latin, Cornell, '71-80. Ed. [with C.
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—Pronunciation, alliteration, quantity.

Satires of Horace. 2, 12, O.—D.

*Latin philol. 1, 12, O.—D.

*Latin compos. 2, 12, O.—D.

*Tacitus and Suetonius. 3, 12, O.—D.

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—Prof. Greek, W. Reserve. Co.—Ed.:
Coll. ser. Greek Auth., *Classical Review*.—
Greek, esp. Homeric, Lang. and Lit.

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Math., Lake Forest; Prof. Greek, Drury
Coll.; Prof. Latin and Greek, Williams.—
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Yale, Berlin.—Prof. of Greek, Illinois
Coll., '83-90.—Conditional sentences in
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Old English phonol. 2, 30.

Chaucer. 2, 30.

Andreas. 1, 30.

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Ph.D., Leipzig, 1892; Asst. Prof. English Lang. — Michigan, '69-70; Leipzig, '75-6, '89-92; Instr. Latin, Michigan, '71-5; Former Teacher Classics and Eng., Belmont School, Cal.

Old Eng. lit. 4, 12, A.-Jun.

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Old Eng. seminary (adv.). 2, 12, O.-Mr.

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MARTHA FOOTE CROW,

Ph.D., Syracuse Univ., 1885; Asst. Prof. Eng. Lit. — Syracuse; Oxford, '92. — Lect. on Hist., Wellesley Coll., '82-4. — Poems, literary essays: Tennyson, Rosetti, Meredith.

Hist. and princip. Eng. versific. 4, 12, A.-Jun.

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Ph.D., Strassburg, 1890; Asst. Prof. Engl. Lit. — Johns Hopkins, '82-4.

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Milton and Caroline poets. 1, 14, F.-My.

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Ph.D., 1892; Asst. Prof. French and Instr. in Romance Langs. — Göttingen, '85; Berlin, '85-6; Paris, '89; Princeton, '89-92. — Instr. Fr., Princeton, '89-90. — Legend of the Holy Grail, Ed. "Contes de Balzac."

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Prof. H. C. ADAMS, Michigan.

The railway problem. 5, 5, Ja. F.

Prof. J. B. CLARK, Smith Coll.

Econ. theory of distrib. 5, 5, O. N.

MICHIGAN.

Reports and discuss. in Current Economic Legislation and Lit. by Economic Faculty. 2, fort.

HENRY C. ADAMS,

Ph.D.; Prof. Pol. Economy and Finance. — Johns Hopkins, Heidelberg, Berlin, École libre des sciences politique, Paris. — Lect. Johns Hopkins and at Cornell; Statistician to Interstate commerce comm.; spec. exp. agent on Transportation, 11th census; Dir. econom. in School of App. Ethics. — Finance, econom. theory, railway and transport. statistics.

- *Princip. sci. of finance. 4, 17.
- *Transportation prob. 2, 17, F.-My.
- Crit. anal. economic thought. 2, 17, O.-Ja.
- Crit. exam. labor and monopoly probs. 2, 17, F.-My.
- Sem. for adv. students. 2, 34.

C. H. COOLEY,

A.B.; Asst. Polit. Econ. — Chief of transport. div. 11th census. — Transportation, esp. fed. regulation of safety appliances and urban transport, theory of statistics.

- Theory of statistics. 1, 34.
- Hist. pol. econ. 2, 17, F.-My.

Michigan—Continued.

F. H. DIXON,

Ph.B.; Asst. in Polit. Econ. — Michigan.
Asst. Ed. *Univ. Record*.Tariff list U.S. (Taussig's text-book).
2, 17, F.—My.

PENNSYLVANIA.

Henry Cary, Stephen Colwell, and Joseph Wharton libraries in economics form a very full collection of works on this subject. See also 10.

EDMUND J. JAMES,

Ph.D., Leipzig; Prof. Political Science. — Halle, Berlin, Leipzig, Halle, 1877. — Pres. Am. Acad. Polit. and Soc. Sci., Pres. Am. Soc. Exten. Univ. teaching. Ed. *Ann. Am. Acad. Polit. and Soc. Sci.* — Municip. gov., public control of monopolies, educ. administration, gov. control of railways, public finance, hist. labor quest., univ. organiz., univ. extension.

Public administr. 2, 30.

Public finance. 2, 30.

Polit. sci. sem. 2, fort.

S. N. PATTEN,

Ph.D., Halle, 1878; Prof. Political Economy. — Halle. — V. Pres. Am. Econom. Ass. '92. — Premises of P. E.; econ. basis of protection, of prohibition; taxation; capital; cost, utility and expense; stabil. of prices; consumption of wealth; dynamic econom.; Malthus and Ricardo; teaching of econ.

Hist. pol. econ. 2, 14, O.—Ja.

Recent dev. of pol. econ. 2, 16,
F.—My.

Scope and method of P. E.

Research course.

R. P. FALKNER,

Ph.D., Halle; Assoc. Prof. Statistics.

[offered in '92-3:]

Intro. to statistics. 2, fort.

Statistics, econ. probs. 2, fort.

J. F. JOHNSON,

A.B.; Lecturer. — New England Editor
Springfield Repub.

Econ. and social aspects of corporations.

PRINCETON.

Fellowship of \$500 in Social Science.

W. M. DANIELS,

A.M.; Asst. Prof. Political Economy.

*Public finance. 2, 16, O.—Ja.

Hist. polit. econ. 2, 16, F.—My.

YALE.

HENRY W. FARNAM,

R.P.D., Strassburg, 1878; Prof. Political Economy. — Yale, '74-5; Berlin, Strassburg, Göttingen, '75-78. — Tutor, Yale, '78-80; joint ed. *Yale Review*. — Guilds, labor quest., poor relief, etc.

Princip. pub. finance. 2, 20, Ja.—My.

Hist. labor organiz. 2, 12, O.—D.

Economics of poor relief. 6 lect.,
O.—D.

A. T. HADLEY,

A.M. Prof. Political Economy. — Railway transportation, Pol. Sci.

*Princip. of economics. 2 (or 3), 32.

Econ. prob. of corporations. 1, 32.

Applic. of mod. econ. meth. to hist.
instituts., esp. to mod. law and
comm. ethics. 1, 32.Econ. policy. 3, 32 [with Dr.
Schwab.]

J. C. SCHWAB,

Ph.D., Göttingen, 1889; Instr. in Pol. Econ. — Yale, '86-7; Berlin, '87-8; Göttingen, '88-9. — Lect. in Pol. Econ., Yale, '90; ed. *Yale Review*. — Hist. local taxation and finance in U. S., finan. hist. Confed. States, public finance.

*Economics (theses). 1, 32.

U. S. pub. finance. 2, 12, O.—D.

Research in finan. hist. U. S. 1,
20, Ja.—My.

13. SOCIAL SCIENCE, ANTHROPOLOGY AND ETHNOLOGY.

BRYN MAWR.

F. H. GIDDINGS [see 12].

Prin. and mod. theories of sociol.
2, 30.

CHICAGO.

ALBION W. SMALL,

Ph.D., Johns Hopkins, 1889; Head Prof. Social Sci., and Dir. of the Affiliated Work; — Newton Theol. Inst., '76-9; Berlin, '79-80; Leipzig, '80-1; Johns Hopkins, '88-9. — Colby Univ., Prof. Hist. and Pol. Econ., '81-8; President, '89-92.

Methodology and bibliog. of soc. sciences. 4, 6, Jul.-Au.

Sem. in psychol., ethics, and sociol. of socialism. 2, 36, O.-Jun.

Province of sociol. and its relat. to special soc. sciences. 4, 12, O.-D.

Province of sociol. and its relat. to special soc. sciences. 8, 6, Jul.-Au.

Soc. psychol. 4, 24, Ja.-Ju.

Probs. soc. statics. 4, 36, O.-Ju.

CHARLES R. HENDERSON,

A.M., B.D., Bapt. Union Theolog. Sem.; Asst. Prof. of Social Science and Recorder of the Univ. — Pastor, Terre Haute, '73-82; Detroit, '82-92. — Papers on labor questions, charities, reforms, dependents, defectives and delinquents.

Social organiz. for promot. soc. welfare (sem.). 2, 36, O.-Ju.

Soc. instituts. of organiz. charity. 4, 6, O. N.

Soc. treatment of dependents and defectives, 4, 6, N. D.

Criminology. 4, 12, Ja.-Mr.

The family. 4, 6, A. My.

Non-polit. and non-econom. soc. instituts. 4, 6, My. Ju.

Methods of promot. soc. welfare by voluntary organiz. 8, 6, Au. S.

MARION TALBOT,

A.M., Boston Univ.; Asst. Prof. Sanitary Science, and Dean (of women) in Univ. Colleges. — Mass. Inst. Technol. — Lect., Lasell Sem., '88-91; Instr. Domestic Sci., Wellesley, '90-92.

Sanitary science (sem.). 2, 36, O.-Ju.

FREDERICK STARR,

Ph.D., Lafayette Coll., 1885; Asst. Prof. Anthropology and Curator of Museum. — Prof. Biol. Sci., Coe Coll., '84-8; in charge of Dept. Ethnol., Am. Mus. Nat. Hist., '89-91.

Lab. work in anthropol. 4, 36, O.-Jun.

Physical anthropol. (lab.). 4, 36, O.-Jun.

E. W. BEMIS [see 12].

Some phases of comp. sociol. 4, 12, A.-Ju.

GERALD M. WEST,

Ph.D., Docent in Anthropology.

Applied anthropol. L 10, 36, O.-Ju.

CLARK.

A. F. CHAMBERLAIN,

Ph.D., Clark, 1892; Lect. in Anthropology. — Toronto, '87-90; Clark, '90-2. — American archæol. and ethnol., Am. dialects.

Gen. anthropol., incl. hist., phys. anthrop., ethnog., ethnol., linguistics, criminal and patholog., histor. and archæolog. anthrop. 1, 30.

Folk-lore and mythol. anc. Greece and Rome in light of mod. comp. research.

Life and educ. of children among prim. races, esp. Am. indians.

COLUMBIA.

R. MAYO-SMITH [see 12].

Communitistic and socialist. theories. 2, 30.

F. H. GIDDINGS,

A.M.; Lect. on Sociology.

Sociology. 2, 16, O.-Ja.

Crime and penology. 2, 14, F.-My.

CORNELL.

[See under 12].

W. F. WILLCOX,

Ph.D.; Asst. Prof. Social Science and Pol. Econ. — Boston Univ. (Law), '84-5; Co-

Cornell—Continued.

lumbia, '85-7; Yale, '88-9; Berlin, '89-90.
— Instr. Philos., Cornell, '91-2. — Vital and Soc. statistics, divorce.

*Social problems. 2, 32.

Social science (adv.). 2, 32 [with Prof. Jenks.]

HARVARD.

Peabody Mus. Am. Archaeol. and Ethnol., with its library, is intended for research. 1 fellowship of \$500 in archaeology; 2 prizes of \$100 each for essays on social questions.

F. W. PUTNAM,

A.M.; Peabody Prof. Am. Archaeology and Ethnol., Curator Peabody Mus. — Chief of Dept. Ethnology, Archaeology and Hist. at World's Columb. Expos.

Course in spec. training in archaeol. and ethnol. during 3 yrs.; lects., field work, explorat. Ability to use French and Spanish necessary.

JOHNS HOPKINS.

Courses given in 1892-3.

DR. E. R. L. GOULD,

U. S. Dept. of Labor.

Current social probs. 50-60 lects.

A. G. WARNER,

Superintendent of Charities, D. C.

Charities and their administ., weekly.

M. BLOOMFIELD [see 2].

Ethnolog. hist. Indo-Europ. peoples, weekly.

MICHIGAN.

F. M. TAYLOR,

Ph.D., Michigan, 1888; Asst. Prof. Political Economy. — Johns Hopkins, '84; Mich., '86-8. — Prof. Hist. and Politics, Albion Coll., '79-92. — Natural law, right of the state to be.

*Land prob., histor. and theoretically considered. 2, 17, O.-Ja.

*Socialism. 2, 17, F.-My.

*Indust. hist. U.S. 2, 17, O.-Ja.

Social philos. esp. with reference to econom. probs. 1, 17, F.-My.

PENNSYLVANIA.

Possesses a museum of American archaeology; C. C. Abbott, M.D., Curator.

DANIEL G. BRINTON [see 7].

Courses in archaeol. explor., esp., American; relat. of archaeol. and ethnol.

YALE.

W. G. SUMNER,

LL.D., Jena, 1884; Prof. Polit. and Social Sci. — Money, wages, protectionism, social classes, elections, biog. of financiers.

Hist. develop. mod. industr. organization. 2, 32.

Anthropology. 2, 32.

*Social science. 2, 32.

14. FINE ARTS AND THE HISTORY OF ART.

[Including Classical Archaeology. See also 3 and 13.]

COLUMBIA.

AUGUSTUS C. MERRIAM [see 3].

*Topog. mythol., and monuments anc. Greece. 1, 30.

*Hist. Greek art. 1, 30.

CORNELL.

Instruction given in connection with Mus. Classical Archaeol., containing casts of sculptures and various models, etc.

ALFRED EMERSON,

Ph.D.; Assoc. Prof. Class. Archaeol., and Curator of Mus. of Casts.

*Class. Archaeol. 2, 32.

*Hist. sculpt. and painting. 2, 32.

*Archæol. sem. 2, 32.

HARVARD.

CHARLES ELIOT NORTON.

[Absent on leave during 1893-4.]

C. H. MOORE,

A.M.; Asst. Prof. of Design in the Fine Arts.

- *Hist. of arts from decline of Roman emp. to end of Renaissance. 3, 15, F.-My.

E. ROBINSON.

- *Hist. Greek art, introd. to art of Egypt, Assyria, and Phœnicia. 3, 16, O.-Ja.
Research in the classic arts.

PRINCETON.

Fellowship of \$500 in Archaeology.

ALLAN MARQUAND,

Ph.D., Johns Hopkins, 1880; Prof. Archæology and History of Art.—Berlin, '77-8; Johns Hopkins, '78-82.—Princeton: Tutor in Latin and Lecturer on Logic, '81-2; Instr. in Hist. of Art, '82-3; Ed. *Am. Jour. of Archæol.*—Epicurean logic, logical diagr., logical machines, hist. sculpture and painting, var Archæol. papers.

- *Renaissance architect. and sculpt. 2, 16, O.-Ja.

- *Renaissance painting. 2, 16, F.-My.

A. L. FROTHINGHAM, JR.,

Ph.D., Leipzig, 1883; Prof. Archæol. and Hist. of Art.—Rome, '78-82; Leipzig, '83; Johns Hopkins, '83-6.—Founder and Manag. Ed. *Am. Jour. Archæol.*—Oriental lit.: Book of Hierotheos, hist. sketch Syriac lit., Gnostic æons., etc.; bapt. of Constantine; hist. sculpt. and paint.; treas. St. Peters; var. Oriental, Early Christian, Romanesque, and Gothic archæolog. papers.

- *Romanesque art. 2, 16, O.-Ja.

- *Gothic art. 2, 16, F.-My.

YALE.

J. M. HOPPIN,

LL.B., Harvard, 1842; Prof. Hist. of Art.—Yale, 1840; Harvard Law School, '42; Andover Sem., '45; Berlin '47—Pastor, 9 yrs.; Prof. Homiletics and Pastoral Theol., Yale, '61-79; Lect. on Forensic eloquence, Yale Law School, '72-5.—Homiletics, theology, essays upon art.

Hist. of Greek art. 20.

Courses in painting, modeling, and drawing by Professors of the Art School.

15. THEORY AND HISTORY OF MUSIC.

HARVARD.

JOHN K. PAINE,

Mus. D.; Prof. of Music.

- †*Harmony. 3, 31.

- †*Counterpoint. 2, 31.

- *Hist. of music. 1-2, 31.
Free thematic music. Fugue in two voices. 2, 31.

MICHIGAN.

A. A. STANLEY,

A.M.; Prof. of Music.

- *Hist. of music. 2, 34.

- Free comp.; instrumentation. 32.

- *Musical analysis and criticism. 1, 32.

YALE.

G. J. STOECKEL,

Mus. D.; Prof. of Music.

- *Harmony. 2, 32.

- *Counterpoint, canon, fugue. 2, 32.

- *Forms. 1, 32.

III. PURE SCIENCE.

16. MATHEMATICS.

BRYN MAWR.

1 fellowship of \$525 in Mathematics.

CHARLOTTE ANGAS SCOTT,

D.Sc., London; Prof. of Mathematics. — Cambridge, Eng., '80-3. — Res. Lect. in Math., Girtton Coll., '80-4; Lect. Newnham Coll., Cambridge, '80-3; Cubics and higher singularities, binomial equation.

*Modern algebra. 2, 30.

Analyt. geom., inc. higher plane curves, higher singularities and cubics (sem.). 2-3, 30.

* JAMES HARKNESS,

M.A., Cambridge and London; Assoc. Prof. Math.—Schol., Trinity Coll., Cambr., '82-8; Math. Schol., London, '87. — Theory of functions.

*Differential equations, with theory of functs. 2, 30.

Abelian integrals. and modular functs. 2, 30.

CHICAGO.

Math. club and sem. of all instrs. and grad. studs. meets fortnightly.

E. H. MOORE,

Ph.D., Yale, 1885; Prof. of Mathematics. — Yale, '85-5; Berlin, '85-6. — Tutor in Math., Yale, '87-9; Northwest. Univ., Asst. Prof., '89-91; Assoc. Prof. Math., '91-2. — Geometry of n dimensions; algebra.

Theory of functions, complex variable. 4, 12, Jul.-S.

Theory of functions, complex variable. 4, 24, O.-Mr.

Elliptic functions. 4, 12, Jul.-S.

Theta functs. of a p variable. 4, 12, A.-Ju.

OSKAR BOLZA,

Ph.D., Göttingen, 1886; Assoc. Prof. Math. — Berlin, Heidelberg, Strassburg, Göttingen. — Reader in Math., Johns Hopkins, '88-9; Assoc. in Math., Clark, '89-92. —

Hyperelliptic functions and theory of substitutions.

Theory of substitutions and applic. to algeb. eqs. 4, 12, Ja.-Mr.

Hyperelliptic functs. 4, 12, A.-Ju.

HEINRICH MASCHKE,

Ph.D., Göttingen, 1880; Asst. Prof. Math. and Physics. — Heidelberg, Breslau, Berlin, Göttingen. — Prof. Math., gymnasium at Berlin, '80-90. — Orthogonal systems of surfaces; finite groups of linear substitutions.

Theory of the potential. 4, 12, Ja.-Mr.

Line-geometry. 4, 12, Ja.-Mr.

Finite groups of linear substitutions. 4, 12, A.-Ju.

J. W. A. YOUNG,

Ph.D., Clark, 1892; Tutor in Math. — Berlin, '88-9; Clark, '89-92.

Elements of theory of invariants, with application to higher plane curves. 4, 12, Jul.-S.

CLARK.

Especial attention paid to each student, to develop research. Very large coll. of mathemat. books, models of surfaces, and other apparatus.

W. E. STORY,

Ph.D., Leipzig, 1875; Prof. Mathematics. — Berlin, Leipzig, '71-5. — Tutor in Math., Harvard, '75-6; Assoc. Asst. Prof.; Assoc. Prof. of Math., Johns Hopkins, '76-89; Assoc. Ed. *A. M. Jour. Math.*, '78-82. — Algebraic invariants and covariants, non-euclidean geom., analyt. geom. (esp. higher plane curves), elliptic functs.

General theory of surfaces and twisted curves (introd.). 2, 16, F.-My.

Algebraic Invariants. 2, 16, O.-Ja.

*Anal. geom. of conic sects., quadric surfs., higher pl. curves. 3, 32.

*Ellip. functs., diff. eqs., calc. of variations. 3, 32.

- *Algebr. substs. and applic. to theory of eqs. 2, 16, O.-Ja.
- Hyperspace and noneuclidean geom. 2, 16, F.-My.
- Twisted curves and developable surfaces (adv.). 2, 16, O.-Ja.
- Enumerative geom. 2, 16, O.-Ja.

HENRY TABER,

Ph.D., Johns Hopkins, 1888; Asst. Prof. Math.—Asst. in Math., Johns Hopkins, '88-9; Docent in Math., Clark, '89-92.—Theory of matrices.

- Quaternions. 2, 16, O.-Ja.
- Finite differences and probabils. 2, 16, F.-My.

M. DE PEROTT,

Docent and Lect. in Math.—Paris, Berlin, '77-80.—Theory of numbers, topology, substitutions.

- Theory of numbers. 2, 16, F.-My.

COLUMBIA.

Prof. J. H. Van Amringe, Dr. T. S. Fiske and Mr. James Macloy offer, for '93-4, the following advanced courses:

- Adv. diff. and integ. calculus. 3, 30.
- Gen. diff. equations. 3, 15.
- Theory of invariants. 3, 15.
- Theory of substitutions. 3, 15.
- Gen. theory of functions. 3, 15.
- Elliptic functs. 3, 15.
- Abelian functs. 3, 15.
- Projective geom. 3, 15.
- Theory of surfaces. 3, 15.

CORNELL.

Any course not desired by at least 5 students may not be given.

J. E. OLIVER,

A.M.; Prof. of Mathematics.

- Differential equations. 2.
- Theory of functs. 3.
- Finite diffs. factorials, diff. eq., with ref. to pract. comput. 2.
- Theories of num. 2.
- Quatern. and vector anal. 2, 20, Ja.-My.
- Theory of prob.; least sq. and applic. 2, 12, O.-D.

- Non-euclidean geom. 2.
- Math. pedagogy. 1.
- Math. essays and theses. 1.
- Directed reading. 1.

L. A. WAIT,

A.B.; Prof. of Math.

- Adv. integ. calc. 2, 32.
- Differential eq. 3, 8, A.-My.
- Rational mechanics. 2, 32.

JAMES MCMAHON,

A.M.; Asst. Prof. Math.—Trinity Coll., Dublin; Cornell; Cambridge, Eng.—Instr. in Math., Cornell, '84-90; Assoc. ed. *Ann. of Math.*—Modern algebra, higher plane curves.

- Gen. theory of algebraic curves and surfaces. 2, 32.
- Theory of quantics (Salmon and Clebsch). 2, 32.

G. W. JONES,

A.M.; Asst. Prof. of Math.

- Lines and surfaces of 1st and 2nd orders. 3, 32.
- Mod. synthetic geom., inc. projective geom. 2, 32.
- Higher algebra (sem.). 2, 32.

C. S. FOWLER,

B.S.; Instr. in Math.

- *Adv. trigonom. inc. theory of imaginaries and hyperbolic functs. 2, 32.

W. G. RAPPELYE,

B.S.; Instr. in Math.

- Adv. differential calculus. 3, 32.

MR. SAUREL.

- The potential funct. and spher. harmonics. 2, 32.

J. H. TANNER,

B.S.; Instr. in Math.

- Adv. algebra, inc. determinants and theory of eqs. 2, 32.

A. C. CREHORE,

Ph.D.; Instr. in Physics.

- Theory of the potential funct., with app. of vector analysis. 2, 32.

HARVARD.

Chauncey Wright Math. prize of \$25.

J. M. PEIRCE,

A.M., Harvard, 1856; Perkins Prof. Mathematics.

†*Quaternions, with applic. to geom. and mechan. (1st course). 3, 31.

*Algebraic plane curves: gen. theory, esp. cubics. 3, 31.

Multiple algebra. 1-2, 31.

Research in algebraic curves, quaternions, or the theory of functions (at option of each student). 1, 32.

C. J. WHITE,

A.M., Prof. Mathematics.

*Theory of equations. 2, 15, F.-My.

†*Diff. and integ. calculus (adv.). 3, 31.

W. E. BYERLY,

Ph.D., Harvard, 1873; Prof. Mathematics. — Harvard, '71-3. — Asst. Prof. Math., Cornell; Asst. Prof. Math., Harvard. — El. geom., diff. calculus, integ. calculus, spherical harmonics.

*Analytic mechanics. 3, 31.

*Fourier's series, spher. harmonics. 3, 31.

B. O. PEIRCE [see 18].

Hydrostatics, hydrokinemat., force functs., and veloc.-potent. functs. 3, 31.

W. F. OSGOOD,

Ph.D., Erlangen, 1890; Instr. in Math. — Harvard, '86-7; Göttingen, '87-91; Erlangen, '89-90. — Symbol. notation, system of two simultaneous ternary quadrat. forms.

*Higher algebra. 3, 31.

Theory of substitutions. 3, 31.

Research in theory of invariants.

MAXIME BÔCHER,

Ph.D., Göttingen, 1891; Instr. in Math. — Göttingen, '88-91. — Math. theory of the potential.

†*Mod. methods in geom. 3, 31.

*Theory of functions. 3, 31.
Functions defined by diff. eq.

JOHNS HOPKINS.

SIMON NEWCOMB [see 17].

THOMAS CRAIG,

Ph.D., Johns Hopkins, 1876-79; Prof. Pure Mathematics — Assoc. Ed. *Am Jour. Math.*

Theory of functions (el.). 2, 30.

Theory of functions (adv.). 2, 30.

Differential equat. 2, 30.

Algebraic integrals of 1 or 2 variables. 3, 15, O.-Ja.

Elliptic funct. 3, 15, F.-My.

Mathemat. Seminary. 1, 30.

FABIAN FRANKLIN,

Ph.D., Johns Hopkins, 1880; Prof. Math.

Theory algebraic forms. 3, 15, O.-Ja.

Analyt. geom. of 2 and 3 dimens. 2, 15, O.-Ja.

Theory of numbers. 3, 15, F.-My.

Theory of probability. 2, 15, F.-My.

L. S. HULBURT,

A.M., Wisconsin, 1888. — Clark, '91-2.

Theory of substitutions; appl. to algebr. equat. 3, 15, O.-Ja.

Gen. theory plane algebr. curves. 3, 15, F.-My.

MICHIGAN.

W. W. BEMAN,

A.M., 1873; Prof. of Mathematics. — Algebra, analyt. geom., calculus.

*Solid analytic geom. 2, 34.

*Differential equat. 3-2, 34.

*Quaternions. 3, 17, F.-My.

*Teacher's sem. in geom. and algebr. 2, 34.

F. N. COLE,

Ph.D.; Asst. Prof. Math. — Harvard, Leipzig, Göttingen. — Theory of substitutions.

*Mod. geom. 3, 34.

*Theory of numbers. 3-2, 34.

ALEXANDER ZIWET,

C.E., Asst. Prof. Math. — Moscow; Polytech. School, Karlsruhe. — Co.-Ed. *Bull., N.Y. Math. Soc.* — Theoretical mechanics.

*Theory of potential. 2, 17, O.-Ja.
Rigid dynamics. 2, 17, F.-My.

- J. L. MARKLEY,
Ph.D., Harvard, 1889; Instr. in Math.
*Mod. higher algebra. 3, 17, F.-My.

PENNSYLVANIA.

- E. S. CRAWLEY,
Ph.D., U. of Penn., 1892; Asst. Prof. Mathematics.—U. of Penn: Instr. in Civil Engineering, '82-5; Instr. Math., '85-89.—Trigonometry.

Theory of numbers. 2, 30.
Higher plane curves. 1, 30.

- G. E. FISHER,
A.B.; Asst. Prof. Math.—Cornell, U. of Pa.—Instr. Math., Cornell, '87-9.

Diff. and integ. calculus (adv.). 2, 30.
Mod. higher algebra. 2, 30.
Differential equat. 2, 30.
Theory of functs. 2, 30.
Seminar. 1, 30.

PRINCETON.

- H. B. FINE,
Ph.D., Leipzig, 1885; Prof. of Mathematics.—Princeton, '80-1; Leipzig, '84-5.—Princeton: Tutor, Asst. Prof. and Prof. of Math. since '81.—Singularities of curves of double and multiple curvature; differential eq.; the number syst. of Algebra.

*Differential eq. 2, 32.
Theory of numbers and higher algebra. 2, 32.
Higher metric geom. 2, 32.

- H. D. THOMPSON,
D.Sc., Princeton; Ph.D., Göttingen; Asst. Prof. Math.—Princeton, '85-6; Fell., Johns Hopkins, '86-7; Göttingen, '87-8, '90.—Zero-value of ellipt. theta-functs.; pencils of conics; hyperelliptic functs.

*Higher plane curves. 2, 32.
Analyt. geom. of 3 dimens. 2, 32.
Theory of functs. 2, 32.

- W. F. MAGIE [see 18].

*Analyt. mechanics. 2, 32

YALE.

Hillhouse math. coll. of 3,000 vols.

- HUBERT A. NEWTON,
LL.D., Michigan, 1868; Prof. of Mathematics.—Meteors, comets, temperature, metric system, transcendental curves.

*Integral calc. and mechanics. 3, 32.
*Shooting stars and meteors. 1, 32.

- J. E. CLARK,
A.M.; Prof. of Math.
Courses not yet announced.

- J. W. GIBBS [see also 18],
Ph.D., Yale, 1863; Prof. Mathematical Physics.—Thermo-dynamics, theory of light, vector analysis.

*Vector analysis. 2, 32.
*Multiple algebra. 1, 32.

- A. W. PHILLIPS,
Ph.D., Yale, 1877; Prof. of Mathematics.—Orbits; math. curves and their graphic representation, esp. by machines.

Analyt. geom. 2, 32.
Map project. and curve trac. 1, 32.

- J. S. DUTCHER,
A.B.; Tutor in Math.
*Hist. of math. 1, 12, O.-D.
*Higher trigonometry. 2, 12, O.-D.
*Mod. geom. 2, 20, Ja.-My.

17. ASTRONOMY.

CHICAGO.

- G. E. HALE,
B.S.; Assoc. Prof. Astronomy, and Dir. of Observatory.—Dir. Kenwood Astro-Phys. Obser. since 1890; Prof. of Astro-phys., Beloit Coll., since '91; Lect. Astro-phys., Northwestern Univ.; Ed. *Astronomy and Astro-physics*.—Solar photog., solar spectra, spectra of elements, spectro-heliograph.

Astronom: photography. L 12, 12,
O.-D.
Solar physics. Lects. and L 12-24,
24, Ja.-Ju.
Stellar spectroscopy. L 12-24, 12,
O.-D.
Astro-physics. research. 48.

Chicago—Continued.

T. J. J. SEE,

Ph.D., Berlin, 1892; Assist. in Astronomy. — Berlin, '89-92. — Observer at Royal Observatory, Berlin, '91-2. — Development of double-star systems; law of attraction in stellar systems, change of color of stars.

Mechanics of a system of bodies and the perturbing funct. 4, 12, O.-D.

Gen. perturbations. 4, 12, Ja.-Mr.

Secular perturb. 4, 12, A.-Ju.

Spheric. and prac. astron. 4, 24, O.-Mr.

Theory of prob. and method of least sqs. 4, 12, A.-Ju.

Astronom. sem. 2, 36, O.-Ju.

COLUMBIA.

Astron. obs. contains 60 in. transit; combined zenith and transit instrumt.; equatorially mounted refractor, 13 in. ap., with spectro-scope; diffraction spectros. with grating; var. instruments for photographic work.

JOHN K. REES,

A.M.; E.M., Columbia, 1875; Prof. of Astronomy and Dir. of Observatory. — Asst. Math., Columbia, '73-6; Prof. Astr., Washington U., '76-81; Prof. Pract. Astron. and Geodesy, Columbia, '81-92; Ed. *School of Mines Quarterly*, '82-8. — Solar eclipses, comets and meteors, Rutherford reductions.

Theories and uses of instruments of pract. astron. and geod.

Theoret. astronomy.

HAROLD JACOBY,

A.B.; Instr. in Astron. — Asst. Astr. U. S. Eclipse Exped. to W. Africa, '89-90. Ed. *Bull. N. Y. Math. Soc.* — Astron. photog.; star clusters, stellar parallax.

? Practical astronomy.

? Comet orbits.

DR. G. W. HILL.

Celestial mechanics. 1, 30.

CORNELL.

J. E. OLIVER [see 16].

Celestial mechanics. 2, 32, or 64.

W. R. SHOEMAKER,

B.S.; Instr. in Math.

Desc. and theoret. ast. 1, 32.

Phys. and math. ast. 2, 32.

HARVARD.

The Astronom. Obs., founded for scientific research, is equipped with instruments of the first class, and with a library of over 14,000 works, and has funds for maintenance, increase and publication. In the Henry Draper memorial dept. an extensive study of spectra and other phys. props. of stars is carried on. Boyden fund sustains observations at great elevation. Photographic study of stars especially provided for. Facilities freely offered to astronomers; also sometimes to special students in astron., who should apply to E. C. Pickering, Director.

JOHNS HOPKINS.

SIMON NEWCOMB,

Ph.D. (Hon.), Leyden, 1875, Heidelberg, '86; LL.D., Yale, '75; Harvard, '84; Columbia, '87; Edinburgh, '91; D.Sc., Dublin; Prof. Math. and Astron. — Sen. Prof. Math., U. S. Navy; Supt. Am. Ephemer. and Naut. Almanac. Ed. *Am. Jour. Math.*

Method of least sqs. 2, 15, O.-Ja.

Astron. optics. 2, 15, F.-My.

Adv. theoret. astron. 2, 15, F.-My.

C. L. POOR,

Ph.D., Johns Hopkins, 1892; Assoc. in Astron.

Theoret. and prac. astron. 3, 30.

Methods of comput. orbits, ephemerides, spec. perturbs. 3, 30.

Astronom. Seminary. 1, 30.

Pract. work with instrum., daily.

MICHIGAN.

"Detroit" Obser., provided with Fitz 13 in. refract. telescope, very valuable meridian circle; sidereal clock. Special observ. for instruction.

ASAPH HALL, JR.

Ph.D. Yale, 1889; Prof. Astronomy and Dir. Observ. — Yale, '85-9. — Asst., Naval Obs., '82-5; Asst. Astron., Yale Obs., '85-9; Asst. Astron., Naval Obs., '89-92. — Observations of satellites and discussion of observations.

Theoret. astronom.: computat. of orbits, correction of approximate elements, theory of spec. perturbs. 5, 34.

Theory gen. perturbations. 3, 17.

Extended pract. course. 34.

PRINCETON.

Halstead obs. appropriated to scientific work, esp. in astronom.-physics. Equatorial 23 in. ap. made by Clark. Highest power spectro-scope fitted for visual and photographic work. Obs. of instruct. devoted to use of students contains 9½ in. ap. Clark equat., besides full complement of other instruments.

- C. A. YOUNG,
Ph.D., LL.D.; Prof. of Astronomy.
Theoret. astron. 1, 32 [with Prof. Reed].

TAYLOR REED,

A.M.; Asst. Prof. Astron.
*Pract. astron. 2, 32.

YALE.

WILLIAM BEEBE,

Asst. Prof. of Mathematics and Astronomy.
— Comet's orbits, graphic algebr., mechanics.
*Pract. astron., observ. work. 2, 12,
O.-D.
*Geodesy. 2, 20, Ja.-Mr.
*Descrip. astron. 1, 32.

18. PHYSICS.

[See also 16, Mathematics, and 17, Astronomy.]

BRYN MAWR.

- A. S. MACKENZIE,
A.B.; Assoc. in Physics. — Johns Hopkins.
'89—91.
Math. theory electricity and magnet-
ism (Clerk Maxwell). 2, 30.

CHICAGO.

- A. A. MICHELSON,
Ph.D., (hon.) W. Reserve, '86; Stevens
Inst., '87; Head Prof. Physics. — Instr.
Phys. U.S. Naval Acad., '75—9; Prof. Phys-
ics, Case School, '83—9; Prof. Physics, '89—92.
Research course. 2, 36, O.—Ju.
Lects. in theoret. physics. L 10—18,
36, O.—Ju.

CLARK.

- ARTHUR G. WEBSTER,
Ph.D., Berlin, 1890; Asst. Prof. Physics.
Harvard, Berlin, Paris, Stockholm, '86—90.
— Instr. in Math., Harvard, '85—6; Doc. in
Math. Phys. Clark, '90—2. — Ratio v of the
electrical unit.
Undulatory theory of light (elastic,
electromag.).
Thermodyn., flow of heat and
electric, kinetic theory of gases,
capillarity.
Partial diff. equat. of math.-phys.
and the arbitrary functs. con-
nected with them.

COLUMBIA.

*One fellowship of \$648 in Physics. The in-
structors of this dept. offered in '92-3 24 lab.
courses in electricity, light, heat, and acous-
tics in addition to the following.*

OGDEN N. ROOD,

A.M.; Prof. of Physics.
Light; heat. 3, L 4, 30.
Sound; electricity. 2, L6, 30.

WILLIAM HALLOCK,

Ph.D., Würzburg, 1881; Adj. Prof. Physics.
— Asst., Phys. Inst., Würzburg, '81—2; Physi-
cist, U.S. Geol. Survey, '82—91; Sr. asst.
Astrophys. Obs., Smithsonian, 91—2; Prof.
Physics, Columbian U., '84—6. — Indices of
refraction, electric. polariz., flow of solids,
chem. action bet. solids, alloy, thermo-elec.
of high temp. geysers, thermal expan. rocks,
spec. gravs.

Electricity; exact phys. measure-
ments. 2, L 6, 30.

CORNELL.

*Franklin Hall devoted exclusively to Physics
affords complete arrangements for exper.
demonstr. and adv. work.*

EDWARD L. NICHOLS,

Ph.D., Göttingen, 1879; Prof. of Physics. —
Leipzig, '75—6; Berlin, '76—8; Göttingen,
'78—9; Johns Hopkins, '79—80. — Prof. Phys.
and Astron., U. of Kansas, 83—7; Ed. *Phys-
ical Review*. — Experimental Physics.
Sem. in period. lit. 1, 32.

Cornell—Continued.

- Abs. measurements in electr. and magnet. 3, lab. work, 32.
 Thermometry and calorimet. 3, lab., 32.
 Adv. spectroscopy. 3, lab., 32.
- G. S. MOLER,
 A.B.; Asst. Prof. Physics.
 Adv. photography, esp. its app. to research. 2, 32.
- FREDERICK BEDELL,
 Ph.D.; Asst. Prof. in Physics.
 Magnetism of iron. 2, 12, O.-D.
 Theory alt. currents. 2, 20, Ja.-My.
 Theory electric. and magnet. 2, 32.

- F. J. ROGERS,
 B.S.; Instr. Physics.
 Thermodynamics. 2, 32.

- C. P. MATTHEWS,
 M.E.; Instr. in Physics.
 Theory of dynamo and motor. 2, 20, Ja.-My.

- J. S. SHEARER,
 B.S.; Instr. in Physics.
 Theory of light. 2, 32.

HARVARD.

The Jefferson Physical Lab. is devoted to instruct. and research in Physics. Isolated tower upon an independent foundation, for investigations requiring great stability or height. Non-magnetic, constant temp. and photogr. rooms. Tyndall fell. of \$500.

- JOHN TROWBRIDGE,
 S.D.; Prof. of Physics and Dir. Jeff. Phys. Laboratory.
 Spectrum anal. Research. 12, 31.
 *Gen. treatment optical phenomena. 1, lab., 31.
 *Electro-dynamics, magnetism, electro-magnetism. 2, lab., 31,
- B. O. PEIRCE,
 Ph.D., Leipzig, 1879; Hollis Prof. Math. and Nat. Philosophy. — Leipzig, 77-9; Berlin, '79-80.
 Research in mathemat. physics.

Math. theory of electrostatics and electrokinematics.

- *Electrostat., electrokinemat., electro-magnetism (part). 1, L 6-8, 31 [with others].

E. H. HALL,

Ph.D., Johns Hopkins, 1881; Asst. Prof. Physics. — Johns Hopkins, '77-81. — Effect of magnetic force on the equipotential lines of an elec. current ("Hall effect"); thermal conductiv. nickel and iron; cylinder condensat. in steam engines.

Research in electromagnetism and heat conduction.

Math. theory magnetism.

Thermodynamics. 2, 16, O.-Ja.

JOHNS HOPKINS.

Special physical building, with constant temp., non-magnetic, and engine rooms, and those for optical work. Lab. esp. furnished for work in electric., magnet., light. Weekly meetings to discuss journals.

H. A. ROWLAND,

Ph.D. (hon.), Johns Hopkins, 1880; Prof. Physics and Dir. Phys. Lab. — Asst. Prof. Rensselaer Polytech., '72-5.

Thermodynamics, heat conduction, physical optics. 4, 30.

J. S. AMES,

Ph.D., Johns Hopkins, 1890; Assoc. in Physics.

Physical optics. 2, 15, O.-Ja.

Theory of attraction. 2, 15, F.-My.

Physical Seminary. 1, 30.

MICHIGAN.

The following courses were announced for '92-3.

H. S. CARHART,

A.M.; Prof. of Physics and Dir. Phys. Lab.

- *The alternate current transformer 2, 17, O.-Ja.

[with Mr. Rowe].

Dynamo-electric machinery. 2, lab., 17, O.-Ja.

Adv. lab. work in electric. and magnet. 2, 17, F.-My.

[with Mr. Reed].

Theory of light. 2, lab., 17, O.-Ja.

G. W. PATTERSON,
A.M., S.B.; Asst. Prof. Physics.

Math. electric. 3, 34.
Distrib. of electric. and photometry
of electric lamps. 2, lab., 17,
F.-My.

PENNSYLVANIA.

1 Fellowship of \$600.

G. F. BARKER,
M.D., Alb. Med. Coll., 1863; Prof. of
Physics. — Prof. Physiol. Chem., Yale, '66-
73; Ed. *Jour. Franklin Inst.*, '73-5; Assoc.
Ed. *Am. Jour. Sci.* since '77. — Text-books
on chem. and phys., and var. papers on
chem. and elec.

Theory and prac. spectroscopy. 2,
14, O.-Ja.
Sound and light. 2, 14, O.-Ja.
Electric. and magnetics. 2, 16,
F.-My.
Theory of potentials. 1, 16, F.-My.
Physical investigations.
[with A. W. Goodspeed].
Abs. phys. measuremts. 6, 30.

A. W. GOODSPEED,
Ph.D., U. of Penn., 1889; Asst. Prof.
Physics. — U. of Penn.: Asst., '84-5; Instr.
in Physics, '85-9.

Theoret. dynamics. 2, 30.
Thermodynamics. 1, 30.

PRINCETON.

C. F. BRACKETT,
M.D., LL.D.; Henry Prof. Physics.
Math. theory electric. and gen. elec-
tric. 8, 32.
Theory of electric. 4, 16.

Also 9 other courses of a more
technical nature.

W. F. MAGIE,
Ph.D., Berlin, 1885; Prof. of Physics. —
Princeton, '79-84; Berlin, '84-5. — Prince-
ton: Asst., '79-82; Instr. in Physics, '82-5;
Asst. Prof. Physics, '85-90. — Electrical
discharge, atmospheric electric, surface ten-
sion of liquids, theory of temp.

*Theory of heat. 2, 16, F.-My.
*Theory electric (el.). 2, 16, O.-Ja.
Lab. practice. L, indef. 32.
Math. physics. L, indef. 32.

YALE.

*Sloane Physical Lab., specially devoted to in-
struction and research in Physics. Large
rooms for optical and photographic work,
especially in spectrum. Engine room;
dynamoes and apparatus for electric and
magnetic work. Provision for general ex-
perimental work and research in Physics.*

J. W. GIBBS [see 16].
Electricity and magnetism. 2, 32.
Theoret. thermodynamics. 2, 32.

A. W. WRIGHT,
Ph.D., Yale, 1861; Prof. Experimental
Physics, in charge Sloane Phys. Lab. —
Formerly Prof. Nat. Philos. and Chem.,
Williams Coll. — Polarization and spectrum
of zodiacal light, comets, sun's corona;
gases in meteorites; electric. deposit. of
metals; ozone.

*Lab. course in physics (el.). L 4, 32.
Lab. course in physics (adv. and
research).

C. S. HASTINGS,
Ph.D., Yale, 1873; Prof. Physics. — For-
merly Assoc. Prof. Physics, Johns Hop-
kins. — Refraction of light; objectives, esp.
telescopic; composit. of the sun.

Detailed treatment of some dept. of
physics with lab.

19. CHEMISTRY.

[For Mineralogy, see under 21, Geology and Geography.]

BRYN MAWR.

1 Fellowship of \$525, open to graduate students in Chemistry.

E. H. KEISER,

Ph.D., Johns Hopkins, 1884; Prof. of Chemistry. — Johns Hopkins, '81-4; Freiburg, '84; Göttingen, '87. — Asst. in Chemistry, Johns Hopkins, '84-5. — Atomic weights, benzene deriv., analyt. chem.

Organic chem. 2, 30.

Theoret. chem. 1, 15, O.-Ja.

Chem. sem. 1, 30.

Journal meeting. 1, 30.

CHICAGO.

J. U. NEF,

Ph.D., München, 1886; Prof. of Chemistry. — München, '84-7. — Prof. Chem., Purdue Univ., '87-9; Asst. Prof. Chem. and acting head of Chem. Dept., Clark, '89-92. — Organ. chem.; tautomeric comp.; constitut. of benzo-quinone, acetacetic ether, bivalent carbon.

Analyt. chem. Lect., 2, 36, O.-Ju.

Organ. chem. 4, 30, O.-My.

Spec. chaps. in org. chem. 2, 6, Au.-S.

Organ. preparations. L 10-20, 30, O.-My.

Research in org. chem. L 30-40, 36, Au.-My.

Journal meetings. 2, 30, O.-My.

H. N. STOKES,

Ph.D., Johns Hopkins, 1884; Asst. Prof. in Inorganic Chemistry. — Johns Hopkins, '81-4; München, '85-6; Zürich, '87-9. — Chemist, U. S. Geol. Surv., '89-92.

Research in inorg. chem. 30-40, 36, O.-Ju.

Adv. inorg. work [or by E. A. Schneider].

E. A. SCHNEIDER,

Ph.D., München, 1882; Asst. Prof. Analyt. Chem. — Chemist, U. S., Geol. Surv., '86-92.

Analyt. chem. 2.

Adv. inorg. work. L 10-20, 12, Jul.-S.

Research in inorg. chem. L 30-40, 48.

FELIX LENGFELD,

Ph.D., Johns Hopkins, 1888; Docent in Chem. — U. of Cal., '84-6; Johns Hopkins, '86-8; Zürich, '88-9; Liège, '89; München, '89-90. — Prof. Chem., So. Dakota Sch. of Mines, '90-1; Instr. of Chem., U. of Cal., '91-2. — Relative stabl. of alk. bromides; addit. of hydrogen to naphthalene and quino-line derivs.; derivs. of nitrogen halogen comp.

Theoret. chem. 2, 30, O.-My.

Hist. of chem. 2, 12, Ja.-Mr.

Physico-chem. methods. 5, 12, A. My.; Au. S.

Research; org. chem. L 30-40, 48.

JULIUS STIEGLITZ,

Ph.D., Berlin; Docent in Chem. — Berlin, '86-9; Göttingen, '88; Clark, '90. — Condensations of amidoximes; benzo quinone carboxylic acids; quantitative method for determining alkaloids in extracts; derivatives of nitrogen halid comp.

Gen. org. chem. Lects. and lab., 10, 12, Jul.-S.

Qualitat. spect. anal. Lects. and lab., 3-5, 12, Ja.-Mr.

Org. nitrogen derivs. 2, 12, O.-D.

Org. preparats. L 10-12, 12, Jul.-S.

Research; org. chem. L 30-40, 48.

CLARK.

Instructors not announced.

Org. chem. 2, 16.

Org. chem. (adv.). 2, 16.

Hist. of chem. since Lavoisier. 1, 32.

Journal meetings. 1, 32.

Research.

COLUMBIA.

ELWYN WALLER,

Ph.D., Columbia, 1875; Prof. Analyt. Chem. — Harvard; Columbia; S. of M. — Assoc. Ed. *Jour. Am. Chem. Soc.; School of Mines Quarterly*. — Sanitary, technical, and a analyt. chem.

Analyt. chem. 3 or 4 courses.

? Determination of atomic weights.

? Investigations of foods, oils, etc.

- C. E. COLBY,
C.E.; Adj. Prof. Org. Chem.
[Offered in '92-3.]
El. org. chem. 3, lab., 30.
Gen. org. chem. 6, L 12, 30.
Adv. org. chem. L 12, 30.
Research; org. chem. 30.

- J. S. C. WELLS,
Ph.D., Columbia, 1877; Instr. in Qualitative Anal. — New methods of analysis.
Exam. of new methods of qualitative anal. L 10, 30.
Spectroscopic anal. L 8, 30.
Special chem. reacts. L 10, 30.
Qual. electrolytic anal. Research.

- F. G. WEICHMANN,
Ph.D., Columbia, 1882; Instr. in Chem. Philos. and Chem. Physics. — Columbia; Berlin; Co-ed. *Sch. of Mines Quart.* '79-81. — Theoretical chem.
Chem. philos. (el.). 4, 30.
Hist. chem. theory; selected problems in theoret. chem. 4, 30.

CORNELL.

Meetings held weekly, attended by instrs. and graduates, for reading journal abstrs.

- G. C. CALDWELL,
Ph.D.; Prof. of Agriculture and Analyt. Chem.
Quantitative anal. (adv.) [with L. M. Dennis].

- W. R. ORNDORFF,
Ph.D., Johns Hopkins, 1887; Asst. Prof. Gen. and Organ. Chem. — Instr. Chem., Cornell, '87-90. — Decomposition of certain org. comp.; preparation certain aldehydes; acetone; mol. wt. hydrog. peroxide and benzoyl peroxide.
Org. chem. (el.) 3, L 3, 32.
Special chaps. in org. chem. 2, 32.
Adv. org. chem., lab. and research. 32.

- L. M. DENNIS,
B.S.; Asst. Prof. Analyt. Chem. — Michigan, München, Aachen, Dresden. — Analyt. chem.; gas analysis.
Adv. inorg. chem. 2, 32.
Adv. gas anal., Lab. 8.
Spectroscop. chem. anal. and colorimetry. 1, lab., 12.

- J. E. TREVOR,
Ph.D., Leipzig, 1892; Asst. Prof. Physical Chem. — Solution of double salts, measurement of small disassoc. grades. (Physical chem.)
Theoretical chem. 3, 32.
Phys. chem. lab. and research. 32.
Colloquim in phys. chem. 1, 32.

HARVARD.

- J. P. COOKE,
LL.D.; Prof. of Chem. and Mineralogy, and Dir. Chem. Lab.
Research: Determination of atomic weights [with Dr. Richards].
Research: Mineralogy [with Dr. Huntington].
Adv. prob. in inorg. chem. and chem. phys., molec. weights and vols., thermo-chem., specific refracting power. 3, lab., 31.
Crystallog. and physics of crystals. 3, lab., 31.
*Chem. philos. 1, 31.

- C. L. JACKSON,
A.M.; Prof. of Chem.
Research: Aromatic compounds.
H. B. HILL,
A.M.; Prof. of Chem.
Research: Organ. chem.
*The carbon compounds. 3, lab., 31.

- T. W. RICHARDS,
Ph.D.; Instr. in Chem.
*Quantitat. anal. (adv.) 3, lab., 31.
[See also course with Prof. Cooke.]

JOHNS HOPKINS.

Meetings for hearing reports on journal articles held weekly. 15-20 lectures by adv. students on special topics.

- IRA REMSEN,
Ph.D., Göttingen, 1870; Prof. of Chemistry and Dir. Chem. Lab. — Prof. Chemistry, Williams, '72-6; Ed. *Amer. Chem. Jour.*
Select. topics in adv. chem. 2, O.-D.
Carbon compounds. 5, Ja.-My.
Special topics of research.

Johns Hopkins—Continued.**H. N. MORSE,**

Ph.D., Göttingen, 1875; Prof. Analyt. Chem.—Instr. Chem., Amherst, '75-6.

Analyt. methods. 1, 30.

MICHIGAN.

Journal Club in which all instructors take part.
F.-My.

A. B. PRESCOTT,

Ph.D., Michigan, 1886; Prof. Organic Chemistry.—General organic and analyt. chem.

Organic synthesis and ultimate anal.
1, L 10-20, 34.

Analyt. org. chem. 1, L 10-20, 34.

Resear. in org. chem. 1, 15-25, 34.

*Org. chem. (el.) 5, 17, O.-Ja.

* " preparations (el.). L 6, 17.

* " preparations. L 15, 17.

* " el. analysis. L 15, 17.

* " synthesis and bibliog. 1, L 6, 17, O.-Ja.

*Research in org. chem. L 15, 17.

OTIS C. JOHNSON,

A.M.; Prof. Applied Chem.

Qualitative analyt. chem. L 15, 17.

Research in inorg. reactions and qual. meth. L 15, 34.

*Adv. qual. anal. 2, L 9, 17, F.-My.

*Outlines chem. tech. 1, 17, O.-Ja.

P. C. FREER,

Ph.D., München, 1887; Prof. General Chem. and Dir. Lab. General Chem.—München, '83-7.—Tufts Coll.: Asst. in Chem., '87; Instr., '88; Lect. in Chem., Michigan, '89.—Org. chem., esp., acetacetic ether, and other ethers.

*Theoret. chem. of recent years. 3, 17, O.-Ja.

Lab. research in gen. chem., org. or inorg.

E. D. CAMPBELL,

B.S.; Asst. Prof. Metallurgy.

Quant. analyt. chem. L 15, 34.

Research in metallurg.-chem. and quant. methods. L 15, 34.

*Adv. quant. anal. L 15, 17.

G. O. HIGLEY,

M.S.; Instr. in Gen. Chem.—Reduct. nitric acid by copper.

*Rarer chem. elem. 3, 17, F.-My.
Research in inorg. chem.

D. M. LICHTY,

M.S.; Instr. in Gen. Chem.

*Methods of determining molec. wts.
3, 17, F.-My.
Research in molec. wts. F.-My.

PENNSYLVANIA.

Weekly meeting for discussion of the literature.

E. F. SMITH,

Ph.D., Göttingen, 1876; Prof. of Chemistry.—Göttingen, '74-6.—Prof. Chem., Wittenberg Coll., '83-8.—Numerous investig. in inorgan., organ. and analyt. chem.

Analyt. chem. 1, 32.

Gen. inorg. chem. (adv.). 1, 32.

Electrolysis.

Sp. topics in analyt. chem.

Synthet. org. chem. 1, 32.

W. J. KEITH,

Ph.D.; Instr. in Chem.

Org. chem. 1, 32.

L. K. FRANKEL,

Ph.D., U. of Penn.; Instr. in Chem.—Electrolytic determ. and separat. of the metals.

Hist. of chem. 1, 32.

Electro-chem. anal.

PRINCETON.**H. B. CORNWALL,**

Ph.D., Columbia, 1887; Prof. Applied Chem. and Mineralogy.

Adv. work in quant. chem. anal.; inorg. and org. 1, lab. 32.

*Inorg. qual. anal. 2, L 5, 16, F.-My.

*Inorg. quant. anal. 1, lab., 16, F.-My.
Other (technical) courses.

I. W. McCAY,

D.Sc.; Prof. of Chemistry.

Theoret. and org. chem. 2, 16, O.-Ja.

YALE.

SAMUEL W. JOHNSON,

A.M. (hon.) Yale; Prof. Theoret. and Agri. Chem. — Leipzig, '53-4; München, '54-5; Owens Coll., Manchester, Eng., '55. — Dir. Conn. Agric. Exp. Stat. — Composition, structure and nutrition of cultivated plants.

Chem. physiol. of vegetation. 2, 12, O.-D.

F. A. GOOCH,

Ph.D., Harvard, 1877; Prof. of Chem. — Harvard, '72-5; Wien, '75-6; Harvard, '76-7. — Asst., Harvard, '72-5; Expert sp. agent U. S. 10th Census, '79-81; Chem. Northern Transcont. Survey, '81-4; U. S. Geol. Surv., '84-6. — Analyt. apparatus, methods and results; separation and determination of elements.

*Exper. inorg. chem. 3 exc., 32.

*Exper. org. chem. 3 exc., 32.

*Qualitat. anal. 3 exc., 32.

*Quantitat. anal. (el.). 3 exc., 32.

Quantitat. anal. (adv.). 3 exc., 32.

Theoret. chem. 1, 32.

Research.

R. H. CHITTENDEN [see 20].

H. L. WELLS,

Ph.B.; Asst. Prof. Analyt. Chem. — Yale, 1877-80; München, '89. — Chemist of Conn. Agric. Exp. Stat., 2 yrs. — Minerals, polyhalides, double-salts, analyt. methods.

Qual. anal. (el.). O.-D.

Gravimetric and volumet. anal. 32.

Ultimate org. anal.; metallurg. and mineralog. chem. 32.

Investig. in inorg. chem. 32.

20. BIOLOGY.

[Including Zoölogy, Botany, Physiology, and Palæontology (in part). See also 21, Geology and Geography.]

BRYN MAWR.

Journal and Reading Clubs hold Fortnightly Meetings. 1 Fellowship of \$525.

T. H. MORGAN,

Ph.D., Johns Hopkins, 1890; Assoc. Prof. Biology. — Embryology of Pycnogonids; develop. of Balanoglossus, develop. of frog, metamerism.

*Embryol. of vertebrates. 1, lab., 30.
Probs. in metamerism and ancestry of vertebrates. fort.

J. W. WARREN,

M.D., Bonn, 1880; Assoc. Prof. Physiology. — Berlin, '71-2; Leipzig, '72-3; Bonn, '73-9. — Asst. and Instr. in Physiol., Harvard, '81-91; Lecturer, Med. Dept., U. of City of N. Y., '85-6; Lect. in Physiol., Mich., '89.

Physiol. optics and applic. of graphic meth. to physiol. research. 1, 30.

Struct. and funct. central nerv. syst. Vertebrates. 1, 30.

Research in physiol. L 6 +, 30.

CHICAGO.

C. O. WHITMAN,

Ph.D., Leipzig, 1878; Head Prof. of Zoölogy. — Leipzig, '75-78. — Prof. Zoölogy, Imp. Univ., Japan, '80-1; Asst. in Zoö., Har-

vard, '83-5; Dir. Allis Lake Lab., '86-9; Dir. Marine Biol. Lab., Wood's Holl, since '88; Prof. Zoöl., Clark, '89-92; Ed. *Jour. of Morphol.*, Pres. Am. Soc. Morphol. — Embryol. and anat., esp. leeches and teleosts; cytology; sense organs; methods morpholog. research; biol. instruction.

Embryol., higher invertebs. 1, L 15, 24, O.-Mr.

Embryol., tectonics verteb. emb. 1, L 15, 12, A.-Jun.

Sem. historical topics. fort. 24, O.-Mr.

H. H. DONALDSON,

Ph.D., Johns Hopkins, 1885; Prof. of Neurology. — Johns Hopkins: Instr. Biol., '83-4; Assoc. in Psychol., '87-8; Asst. Prof. Neurology, Clark, '89-92. — Temperature sense, brain of Laura Bridgman.

Architect. central nerv. syst. 8, 12, O.-D.

Anat. of the spec. sense organs. 8, 6, Ja. F.

Physical characters of brain as related to intelligence. 8, 6, F. Mr.

Doctrine of localiz. of funct. in cerebral cortex. 8, 12, A.-Jun.

Dev. central nerv. syst. 8, 12, A.-Jun.

Seminary. 2, 48.

Chicago—Continued.

G. BAUR,

Ph.D., München, 1882; Asst. Prof. Compar. Osteology and Palæontol.—München, '79-81; Leipzig, '81-82.—Asst. to Prof. C. v. Kupffer, München, '82-4; Asst. to O. C. Marsh, U. S. Geol. Surv., '84-90; Asst. Palæontol., Yale, '86-90; Docent in Comp. Osteol. and Palæontol., Clark, '90-2.—Verteb. osteol. and palæontol., gen. zool.

Outlines verteb. zool. and palæontol. (el.). 2, 12, O.-D.

Comp. osteol. and phylog. of vertebs. 1, 24, Ja.-Jun.

Sem. in comp. osteol. 2, 24, Ja.-Jun.

Research in osteol. living and extinct vertebs. 26, 36, O.-Jun.

Palæontolog. field work. Jul.-S.

JACQUES LOEB,

M.D., Strassburg, 1884; Asst. Prof. of Physiology.—Asst. Physiol., Würzburg, '86-8; Asst. Physiol., Strassburg; Assoc. in Biol., Bryn Mawr, '91-2.

Orig. investig. in physiol. Lab., daily, 48.

Physiol. sense org. and periph. nerv. syst. 4, L4, 12, O.-D.

Physiol. circulation, respir., animal heat. 4, L4, 12, Ja.-Mr.

Gen. physiol. nerves and muscles. 1, L4, 12, A.-Jun.

Seminary. 2, 36, O.-Jun.

W. M. WHEELER,

Ph.D., Clark, 1892; Instr. in Embryology.—Asst. in Morphol., Clark, '90-2.—Insects: Embryology, biology, fauna.

Vertebrate embryol. 3, L7, 36 O.-Jun.

E. O. JORDAN,

Ph.D., Clark, 1892; Tutor in Zoölogy.—Clark, '90-2.—Lect. on Biol., Mass. Inst. Tech., '89-90; Asst. Biol. to Mass. State Bd. of Health.

Sanitary biol. 4, 12, A.-Jun.

S. WATASE,

Ph.D., Johns Hopkins, 1890; Reader in Cellular Biol.—Johns Hopkins, '87-90.—Asst. and Lect. in Zool., Clark, '90-2; Instr. at Marine Biol. Lab., Wood's Holl.—Fish-fins; compound eyes; cleavage, esp. in Cephalopods; spermatogenesis.

Cellular biol., lects. and demonstr.

D. J. LINGLE,

Ph.D., Johns Hopkins, 1892; Reader in Physiology.—Johns Hopkins, '87-9; '90-2.—Asst. Prof. Biol., Tulane.—Vaso-motor nerves of the heart; physiol. of Ascedian heart.

Physiol. of digestion, secretion, metabolism. 2, L6, 12, A.-Jun.

Physiol. demonstration. L 6-8, Jul.-S.

CLARK.

C. F. HODGE,

Ph.D., Johns Hopkins, 1889; Asst. Prof. Physiol. and Neurol.

Gen. biol. 1, L6, O.-Ja.

Comp. study nervous syst. and sense organs. 1, 32.

Muscle and nerve physiol. lab., Ja.-My.

W. H. BURNHAM.

Embryol. of hum. brain and sense organs. 6 lects.

Instructor unannounced.

Cerebral localization. 6 lects.

Pract. histol. of nerv. syst. lab.

COLUMBIA.

Herbarium contains nearly 500,000 spec., esp. from Eng. and Scot., U. S. and Switz.; mosses.

J. G. CURTIS,

M.D.; Prof. of Physiology.

[with F. S. Lee.]

Comp. human and vert. physiol. 4-5, 32.

Lab. work in physical physiol.

N. L. BRITTON,

Ph.D., Columbia, 1881; Prof. of Botany.—Columbia: Instr. in Botany, '87-9; Adj. Prof. Botany, '89-91; Ed. *Bull. and Mem. Torrey Botanical Club*; Ed. *Trans. N. Y. Acad. Sci.*—Flora of New Jersey, North Am., Bolivia, Paraguay; geograph. distr. plants.

Nat. orders flowering plants. 1, L4, 30.

Cryptogamic botany. 1, L4, 30.

Cryptogamic botany (adv.). 1, L4, 30.

Research in systematic botany.

H. F. OSBORN,

Sc.D., DaCosta Prof. of Biology.

Morphol. of mammals. 6, 30.

Comp. morphol. 6, 30. [With E. B. Wilson.]

*Comp. neurology. 3, 30.

E. B. WILSON,

Ph.D., Johns Hopkins, 1882; Adj. Prof. Invertebrate Morphology. — Yale, '78-9; Johns Hopkins, '79-82; Cambridge (Eng.), Leipzig, '82-3; München, '91-2. — Asst. Zoology, Yale, '78-9; Asst. Biol., Johns Hopkins, '81-2; Lect. Biol., Williams, '83-4; Lect. Mass. Inst. Technol., '84-5; Prof. Biol., '85-91. — Embryol. invertebrates, cytology.

Compar. embryol. 6, 30.

[See also under H. F. Osborn.]

F. S. LEE,

Ph.D., Johns Hopkins, 1885; Demonstr. in Physiology. — Johns Hopkins, '81-5; Leipzig, '85-6. — Assoc. in Physiol. and Histol., Bryn Mawr, '87-91. — Action of salts, etc., upon arteries, electric phenomena of contracting muscle, equilibrium-sense.

*General physiology.

[See also under J. G. Curtis.]

C. C. CURTIS,

A.M., Columbia, 1892; Ph.D., Syracuse, '93. — Asst. in Botany.

Adv. vegetable anatomy.

BASHFORD DEAN,

Ph.D., Columbia, 1890; Instr. in Biology. — Columbia, '88-90; München, '92. — Asst. U. S. Fish. Com. — Insectiv. plants, biol. of oyster, fossil fishes, fish fins.

Morphol. fishes, esp. palæozoic. 4, 30.

ARTHUR WILLEY,

Tutor in Biol. — Ancestry of Chordata, Amphioxus, Tunicata.

Morphol. and interrelationships of Platyhelminthes. 1, 15, F-My.

CORNELL.

Herbar. contains 15,000 sp.; Insectary of Agric. Exp. Stat. affords facilities for investig. in life history of insects. Museum with 3,000 human and comp. anat. specs., and 1,500 histol. and embryolog. specs.

BURT G. WILDER,

M.D., Harvard, 1866; Prof. Physiology, Comp. Anatomy and Zoology. — Harvard (Jeffries Wyman) — Pres. Am. Neurolog. Ass. — Anat. nomenclature; gross. anat. of brain, human and comp.; anat. of cat; ganoid fishes; spiders.

Morph. of brain. 2, 8, A. My.

A. N. PRENTISS,

M.S.; Prof. Botany and Arboriculture. — Mich. Agric. Coll., '63-5. — Prof. Bot. and Horticult., Mich. Agric. Coll., '64-8. — Mode of distrib. of plants; destruct. of insects by fungi.

Exper. plant physiol.

Research in phanerog. and plant physiol.

J. H. COMSTOCK,

B.S.; Prof. of Entomology and Gen. Invertebrate Zoology. — Yale, '74-5; Leipzig, '88-9. — Formerly U.S. Entomologist; also Prof. Entomol., Leland Stanford Jr. Univ. — Econom. Entomology; Systemat. Entomol.

Lab. work in insect anat., life hist., and classific. L 25, 20, O.-D.; A. My.

Entomolog. sem. 2, 8, A.-My.

Summer course in entomol. 3 lects., field and lab. work. 10, Ju.-S.

S. H. GAGE,

B.S.; Assoc. Prof. Physiology. — Cornell, '77, Göttingen, '89. — Instr., Asst. Prof. and Assoc. Prof., Cornell, since '78. — Anat., histol., physiol., microscopy.

Anatom. methods and gross anat. 3, 12, O.-D.

Microscope and micros. meths. 3, 12, Ja.-Mr.

Meths. and el. embryol. 4, 8, A. My.

Vertebrate zool. lab. daily. 32.

Vert. histol. lab. daily. 32.

G. F. ATKINSON,

Ph.B.; Assoc. Prof. Botany.

*Fungi. 2, lab., 8, A. My.
Research in cryptogams.

W. W. ROWLEE,

B.L.; D.Sc.; Asst. Prof. Botany.

Herbar. work on Phanerogams. 1, lab., 8, A.-My.

Histol. of plants. 1, lab., 12, O.-D.

HARVARD.

Museum Compar. Zoölogy, founded by Louis Agassiz, 1859 (Alexander Agassiz, curator), has collections, under the charge of museum assts., and available for scientific study. Lib. of over 23,000 vols., and half as many pamphlets on Zoölogy and Palæontology. Humboldt Fund maintains one or more students at Museum, Newport Marine Lab., or Wood's Holl, U.S.F.C. Stat. Investigations are published in the Bull. Mus. Comp. Zool. Botanic garden of 7 acres offers facilities for investig. Herbarium of over 200,000 species, includ. types of Synoptical Flora of N. A. Bot. lib. at Herbar. of over 9,000 vols. Bot. Mus., incl. Blaschka glass models. Extensive cryptogamic herb. Zoölogical and Botanical Clubs meet fortnightly. Virginia Barret Gibbs Schol. of \$250, open to students in Zool., also 2 tables at Naples Zool. Stat.

GEORGE L. GOODALE,

M.D., Harvard, 1863, LL.D.; Fisher Prof. Natural History. — Harvard, Tübingen. — Formerly Pres. Am. Naturalists, Am. Soc. Adv. Sci., Bost. Soc. N.H.; Assoc. Ed. *Am. Jour. Sci. and Arts.* — Physiol. and Econom. botany.

Research in systematic phanerog. botany; veg. phys.; and econ. bot.

*Phanerog. botany. 2, lab., 31.

W. G. FARLOW,

M.D.; Prof. Cryptogamic Botany.

Research in struct. and devel. cryptogams [with R. Thaxter].

*Cryptogamic bot. [with R. Thaxter].

E. L. MARK,

Ph.D.; Leipzig, 1876; Hersey, Prof. Anatomy. — Leipzig, '73-6; Jena, '76. — Instr. Math., U. of Mich., '71-2; Harvard: Instr. Zool., '83-6; Asst. Prof., '83-6. Ed. *Contrib. from Zool. Lab. Mus. Comp. Zool.* at Harvard Coll. since '83. — Anat. and histol. of Coccidæ and Phylloxera; Maturation, fecundation and cleavage in Limax; Simple eyes in Arthrop.; Lepidosteus; Turbellaria.

Research in embryol.

*Microscop. anat. 3, lab., 16, O.-Ja.

*Embryol. of Verteb. 3, lab., 15, F.-My.

ROLAND THAXTER,

Ph.D., Harvard, 1888; Asst. Prof. Cryptogamic Botany. — Mycology: morphological and systemat.; econom. mycol.

Cryptogam. bot. 3, lab., 15, F.-My. [See also under W. G. Farlow.]

G. H. PARKER,

Ph.D., Harvard, 1891; Instr. Zoölogy. — Harvard, '87-91; Leipzig, '91-2; Freiburg, '92-3; Naples. — Harvard: Asst., '86-88; Instr. Zool., '88-91; Biologist, Mass. State Bd. of Health, '88-90. — Compound eyes in Arthropods; animals of drinking water.

*Comp. anat. verteb. 3, lab., 31.

*Nervous system and org. spec. sense. 2, lab., 16, O.-Ja.

C. B. DAVENPORT,

Ph.D., Harvard, 1892; Instr. Zoölogy. — Harvard, '89-92. — Non-sex. reprod., esp. in Bryozoa; Umatella.

*Experimental Morphol. 3, lab., 15, F.-My.

D. D. SLADE,

M.D.; Lect. on Comp. Osteol.

Comp. osteol. (research).

JOHNS HOPKINS.

Marine lab. in Zool. is open during part of year, probably at Jamaica in '94. Students have access to Capt. J. D. Smith's private herbar., 78,000 sheets, esp. flora U.S. and Am. tropics; also to the Schimper coll. Europ. phaner., and Fitzinger coll. mosses and others. Journal club meets weekly. Univ. Circular, and Studies from Biol. Lab. provide for publication. The income of the Adam T. Bruce Fell. of \$10,000 is yearly awarded to a student in Zool.

W. K. BROOKS,

Ph.D., Harvard, 1875; Prof. Animal Morphol. and Dir. Chesapeake Zool. Lab. — Assoc. ed. *Studies from the Biolog. Lab.*

Principles of Zool. 3, N.-A.

Marine Zool. 6, 12, A.-Ju.

Zool. Sem. 22, O.-Mr.

Evening readings in Zool., winter.

W. H. HOWELL,

Ph.D., Johns Hopkins, 1884; M.D. — Johns Hopkins: Asst., Associate, Assoc. Prof., '84-89; Lect. Michigan, '89-90; Prof. Physiol. and Histol., Mich., '90-92; Assoc. Prof. Physiol., Harvard, '92-3.

Physiolog. sem. weekly, 15, O.-Ja.

Physiology, adv. topics. weekly, 15, F.-My.

Adv. lab. work in physiol.

Research in animal physiol.

*Animal physiol. (el.).

E. A. ANDREWS,
Ph.D., Johns Hopkins, 1887; Assoc. in
Biology.

*General Zool. 2, lab., 18, Ja.-My.

DR. LOTSY,

Vegetable histol. 5, 8.
Botany (adv.). Ja. F.

MICHIGAN.

W. P. LOMBARD,

M.D., Harvard, '81; Prof. of Physiology.—
Harvard, '78-81; Leipzig, '82-5; Asst. in
Physiol., Coll. Phys. and Surg., N. Y. city,
'88; Asst. Prof. Physiol., Clark, '89-92.

Animal physiol. 5, 34.

Lab. work. L 10, 6.

Physiolog. methods. L 3, 17.
Research.

J. E. REIGHARD,

Ph.B.; Prof. Animal Morphol.—Mus.
Comp. Zool., Harvard, '83-5; Michigan,
'85-6.—Michigan: Instr., '86-9; Asst. Prof.,
'89-92.—Anat. and histol. Aulophorus; em-
bryol. of teleosts.

*Comp. embryol. of vertebr. 2, L 10,
17, F.-My.

*Comp. anat. of vertebr. 2, L 10, 17,
O.-Ja.

Field work on invert. fauna of neigh-
boring waters. 1, L 4, 34. [Para-
sites by H. B. Ward.]

Journal club. 1, 34.

Research in animal morphol. 34.

G. C. HUBER,

M.D., 1888; Asst. Prof. Histology.

Microscop. anat. brain and spec.
sense organs. 1-2, L 10-15, 1.

F. C. NEWCOMBE,

B.S.; Asst. Prof. Botany.—Leipzig, '92-3.
—Cryptogamic botany.

*Vegetable histol. 2, L 10, 17.

*Vegetable physiol. 2, L 10, 17.

L. N. JOHNSON,

A.M.; Inst. in Botany.

Cryptog. botany, algæ. 2, L 10, 17.

Cryptog. botany, fungi. 2, L 10, 17.

H. B. WARD,

Ph.D., Harvard, 1892; Instr. Invertebrate
Morphol.—Göttingen, '88-9; Freiburg, '89-

90; Leipzig, '90; Harvard, '90-2.—Anat.
and histol. of Sipunculus and of Nectonema.

*Invertebr. morphol. 2, L 6, 34.

[See also under J. E. Reighard.]

PENNSYLVANIA.

*Burk herbarium of 6,000 spec. of flora about
Philadelphia. Rothrock herbar. of 50,000
spec. esp. N. A. (inc. Mexico).*

HARRISON ALLEN,

M.D.; Prof. Comp. Anat. and Zoölogy.—
Human anat. and comp. anat. of mammals.

Mechanism of locomotion. 2, 30.

Human craniology. 2, 30.

J. T. ROTHROCK,

M.D.; Prof. Botany.

[Courses not announced.]

W. P. WILSON,

Sc.D.; Prof. Botany.

Plant histol. 6, lab., 15, O.-Ja.

Plant physiol. 6, lab., 15, F.-My.

J. A. RYDER,

Ph.D. (hon.), U. of Penn.; Prof. Comparative
Embryology.—Spec. Asst. U. S. Fish
Com. '80-6.—About 200 papers on morphol.
and physiol.

Physiolog. anat.; mechanics of de-
velopment.

J. M. MACFARLANE,

D.Sc., Edinburgh, 1883; Prof. of Botany.—
Edinburgh Univ.: Asst. in Botany, '79-87;
Asst. Prof., '87-91; Prof. Botany, Roy.
Veter. Coll., and St. George's Coll., Edin-
burgh, '80-91. Ed. *Trans. Bot. Soc. Edin-
burgh*, '85-90.—Cell history; pitched
insectiv. plants; struct. of hybrids; history
of Dionaea.

Struct. and classif. of Phanerogams.

Life hists. and affins. select. types
cryptogs. and phanerogs.

Comp. stud. fams. and genera
phanerogams.

HORACE JAYNE,

M.D., Pennsylvania, 1882; Prof. Vertebrate
Morphology.—Jena, Leipzig, '82-3; Johns
Hopkins, '83-4.—Abnormalities in N. A.
Coleoptera; N. A. Dermestidae.

Select. topics in verteb. morph.

Osteol. mammalia. 4, 30.

PRINCETON.

1 fellowship of \$400 and 1 fellowship giving free use of table at U. S. F. C. station, Woods Holl.

The following subjects of instruction are arranged for:

GEORGE MACLOSKIE,

LL.D., D.Sc.; Prof. of Biology.

Anat. and embryol. of higher invertebr.; vegetable morphol. and histol.

H. B. CORNWALL [see 19].

Physiol. chem.

WILLIAM LIBBEY JR., [see 21].

The microscope and microscopic technology; histology; deep sea soundings and dredgings.

W. B. SCOTT [see 21].

Vertebr. and invert. palæontol.; adv. embryol.

W. M. RANKIN,

Ph.D.; Instr. in Biol. and Curator Zool. Mus.

Anat. and embryol. mollusca.

C. F. W. MCCLURE and J. Y. GRAHAM.

Instructors in Biol.

Comp. anat. of vertebr.; el. of embryology.

YALE.

D. C. EATON,

A.M., Yale, 1864; Prof. of Botany. — Ferns and mosses.

[with W. A. Setchell.]

Botany.

Pteridology and Bryology. 2, lab. 32.

A. E. VERRILL,

A.M., Yale, 1867; Prof. of Zoölogy, Instr. in Geol., and Curator Zool. collections. — Anatomy, taxonomy and distrib. animals, esp. Am. invertebr.

Zoölogy.

S. I. SMITH.

A.M.; Prof. Comp. Anatomy. — Anatomy, development, taxonomy and distrib. of crustacea.

*El. anat. and histol. 4, lab., 12, O.-D.

*Comp. anat. and gen. biol. 6, lab., 20, Ja.-My.

Comp. anat. and gen. biol. (adv.).

R. H. CHITTENDEN,

Ph.D.; Prof. Physiological chemistry. — Yale, Heidelberg. — Instr. physiolog. chem., Yale, '76-82. Ed. *Studies from Lab. Physiol. Chem.*, Yale, '84-9. Assoc. ed. *Jour. of Physiol.* — Origin, action, and composition of var. chem. subs. in animal body, esp. action of digestive juices.

Physiol. chem. and physiol. Research.

*Physiology. 1, 32.

*Physiol. chem. 4, 20, J.-My.

C. E. BEECHER,

Ph.D., Yale, 1889; Asst. Prof. Palæontology. — Brachiopoda, sponges, corals, crustacea.

Invertebrate palæontol. 6, 32.

W. A. SETCHELL,

Ph.D., Harvard, 1891; Instr. in Botany. — Struct. and devel. Tuomeya; life-hist. Sacchariza.

[See under D. C. Eaton.]

21. GEOLOGY AND GEOGRAPHY.

[Including Palæontology (in part), Lithology, and Mineralogy. See also 19, Chemistry, and 20, Biology.]

CHICAGO.

T. C. CHAMBERLAIN,

Ph.D., U. of Mich., and U. of Wisc., 1882; LL.D., U. of Mich., 1887; Head Prof. of Geology, and Dean in the Coll. of Sci.—Asst., then Chief State Geologist, Wisc., since '73; U.S. Geol. Survey, since '82; Prof. Geol., Beloit Coll., '73-82; Lect. ibid., '82-7; Prof. Geol., Columbian U., '85-7; Pres. U. of Wisc., '87-92. Ed. *Journal of Geology*.—Geology, esp. glacial.

Principles and working methods of geol. 5-10, 24, O.-Mr.
Special geol. [with R. D. Salisbury].
Local field geol. [ditto].
Seminary. fort., 48.
Geol. in camp. 12, Jul.-S.

R. D. SALISBURY,

A.M., Beloit, 1881; Prof. Geograph. Geol.—Heidelberg, '87-8.—Beloit: Instr. Geol. and Biol., '83-4; Prof. Geol., '84-91; Asst. U.S. Geol. Survey, since '82; Prof. Gen. and Geogr. Geol., U. of Wisc., '91-2.

Dynamic geography. 5-10, 12 or 6, Ja.-Mr.

J. P. IDDINGS,

Ph.B.; Assoc. Prof. Petrology.—Yale, '77-8; Columbia, '78-9; Heidelberg (Rosenbusch), '79-80.—Asst. Geol. U.S. Geol. Sur. '80-8; Geologist since '88.—Petrography.

Petrography. 10-5, 24, O.-Mr.

Petrology. A. Ju.

? Field petrology. 10, 12.

R. A. F. PENROSE, JR.,

Ph.D., Harvard, 1886; Assoc. Prof. Economic Geol.—Harvard, '84-6.—Asst. Geol., Geol. Survey of Texas, '88-9; of Arkansas, '89-92.—Manganese phosphate and iron-ore deposits; Texas tertiary.

Elements econ. geol. 5, 12, A.—Ju.
Ore deposits and allied formations. 5, 12, A.—Ju.

C. R. VAN HISE,

Ph.D., U. of Wisc., 1882; Non-res. Prof. Pre-Cambrian Geol.; also Prof. of Geology, U. of Wisconsin.—U. of Wisc.: Instr. and Prof. since '79; U.S. Geol. Survey, since

'83; Assoc. Editor *Journ. Geol.*—Lake Superior stratig.; iron ores, Penokee.—Gogebic ser. of Lake Super. region; pre-Cambrian formations of N.A.

Pre-Cambrian geol. 5, 6, Ja. F.
Lab. work in ditto. L 5, 6, Ja. F.

C. D. WALCOTT,

Non-res. Prof. palæontol. geol.; U.S. Geol. Sur., '76-33.

Palæontology. geol.

W. H. HOLMES,

A.B.; Non-res. Prof. Archæolog.-geol.—U.S. Geol. Sur., '80-89; Nat. Mus., curator Dept. Aborig. pottery, '82-93; U.S. Bureau Ethnol., '89-93.

Archæolog. geol. 5, 6.

COLUMBIA.

J. F. KEMP,

E.M.; Prof. Geology.—Columbia, '84-5; Leipzig, München, '85-6.—Cornell: Instr. and Assoc. Prof. Geol. and Mineral., '86-91; Columbia, Adj. Prof. Geol., '91-2. Ed. *Sch. of Mines Quart.*—Econom. geol., petrography, mineral.

Econom. geol. 3, 30.
Petrography. 2, L 4, 30.
Petrography (adv.). L 8, 30.
Research in petrog.

A. J. MOSES,

Ph.D.; Adj. Prof. Mineralogy.

Systemat. mineral. 9, 30.

Physical mineral. 9, 30.

[with Mr. Luquer.]

Descrip. and determ. min. 3, 30.
Optical. mineral. and crystallog.
Rock-forming minerals.

L. MCI. LUQUER,

C.E.; Tutor in Mineralogy.

Optical props. minerals. 9, 30.

Descrip. and math. crystallog.

[See also under A. J. Moses.]

Columbia—Continued.

C. A. HOLLICK,

Ph.B.; Tutor in Geology.—Columbia.—
Curator, N.Y. Acad. Sci.—Relations bet.
geolog. formations and distrib. of plants;
fossil botany, esp. Cretaceous and Tertiary
of East. U.S.

Invertebr. palæontol.

Palæobotany. 1, L 4.

Research in flora of cert. horizons.

Research also with Prof. Kemp.

CORNELL.

*Museum of Geology, Palæontol., and Mineral.
comprises rich collection N.Y. state fossils
(Jewett coll.) and other collections.*

R. S. TARR,

B.S.; Asst. Prof. Geology.—Harvard.—
Asst. Geol., Harvard; Asst. Geol. Texas
Geol. Sur. and U.S. Geol. Sur.—Petro-
graphy, stratig. geol., phys. geog.

Glacial geol. 2, L 1, 32.

Petrography. 1, L 2, 20, Ja.—My.,
[with A. S. Eakle.]

Research in geol. 2, 32.

Adv. petrog. Research. L 3, 32.

A. S. EAKLE,

B.S.; Instr. in Mineral. and Geol.

Mineralogy. 1, L 2, 20, Ja.—My.

Gen. and econ. geol. 3, 8, A. My.

Adv. mineral.

HARVARD.

*Geological conference meets weekly for presenta-
tion and discussion of papers. Advanced
geological work, with original investiga-
tion, is conducted by all instructors, during
the summer as well as during the rest of
the year.*

J. D. WHITNEY,

LL.D.; Sturgis-Hooper Prof. of Geology.

*Economic geol. 2, lab., 31.

Geographical methods and results.
1, 31.

N. S. SHALER,

S.D.; Prof. of Geology.

[with R. T. Jackson.]

*Palæontology (el.). 3, lab., 31.

*Histor. geol. 1, lab., 31.

Palæontology. Research.

W. M. DAVIS,

S.B., M.E.; Prof. Physical Geography.—
Asst., Argentine Nat. Obs., Cordova, Ar-
gentine Repub., '70-3; at Harvard since '76.
—Triassic formation of Conn.; glacial geol.;
physical geography, esp. nat. hist. of rivers;
meteorology.

Research in phys. geog. and meteor-
ology.

J. E. WOLFF,

Ph.D.; Asst. Prof. Petrography.

*Petrography. 2, lab., 31.

Petrograph. research.

T. W. HARRIS,

Ph.D., Harvard, 1890; Instr. in Geology.

Struct. and dynam. geol. of strati-
fied rocks, esp. hist. and results
of geolog. surv. in U.S.

Stratigraph. geol., 6 wks. field work,
Jul. Au.

J. B. WOODWORTH,

Asst. in Geology.

*Gen. critical geol. 2, lab., 31.

JOHNS HOPKINS.

*Geolog. conferences held weekly to read and
discuss papers.*

G. H. WILLIAMS,

Ph.D., Heidelberg, 1882; Prof. Inorganic
Geology and Mineralogy.—Amherst, '79;
Göttingen, '79-80; Heidelberg, '80-2.—
Assoc. Prof., Johns Hopkins, '83-92. Assoc.
ed. *Jour. of Geol.*—Gen. mineral., crystal-
log., gen. petrography, geol. of Maryland.

Petrography. 3, lab., 20, Ja.—My.

Chem. and hypogene-dynam. geol.
4 exc., 12, O.—D.

W. B. CLARK,

Ph.D., München, 1887; Assoc. Prof. Or-
ganic Geol.—München, '84-7.—Dir. Mary-
land State Weather service; Asst. U. S.
Geol. Sur.—Stratigraphical geol. and palæ-
ontol., esp. Eocene of U. S.; mesozoic echi-
noderms of U. S.; Cretac. and tertiary geol.
of N. J. and Md., Phys. features of Md.

Organic geol. 4, exc., 18, Ja.—My.

Palæontology. 3, 30.

Physical geog. 3, 12, O.—D.

MICHIGAN.

I. C. RUSSELL,

M.S.; C.E.; Prof. Geology.—Columbia, Sch. of M., '72-4. — Asst. U. S. Transit of Venus exped., '74-5; Asst. Prof. Geol., Columbia, '75-77; Asst. Geol., U. S. Sur. 100th Mer., '78; Asst. Geol. and Geol., U. S. Geol. Sur., '80-92; Assoc. ed. *Jour. of Geol.* — Pleistocene lakes of Great Basin; existing glac. U. S.; geol. of Oregon, Wash., and Alaska.

Physical and glac. geol. 2, 17, O.-Ja.
Palæontolog. investig. 2, lab., 17,
F.-My.

PRINCETON.

WILLIAM LIBBY, JR.,

Ph.D., Princeton, 1879; Prof. Physical Geography and of Normal Histology, and Dir. E.M. Mus. Geol. and Archæol.—Princeton, '78-9; Berlin, '79-80; Paris, '80. — Asst. in Scientific Inquiry, U. S. Fish Com. — 4th ed. Smithsonian meteorol. and physical tables; physical investig. of Gulf Stream.

Relat. of phys. geog. to hist. of mankind. 1, 16, F.-Ju.

W. B. SCOTT,

Ph.D., Heidelberg, 1880; Blair Prof. Geol. — Princeton, '77-8; London, Cambridge, '78-9; Heidelberg, '80. — Palæontol. and embryol. of vertebr.; histor. geol., theories of evolution.

Physical geology. 2, 32.

YALE.

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G. J. BRUSH,

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[with S. L. Penfield and L. V. Pirsson.]

Mineralogy, lab. and lects.

Lithology; microscop. petrog.

W. H. BREWER see also 12].

Ph.D., Washington and Jefferson, 1880; Norton Prof. Agriculture. — Formerly Prof. Nat. Sci. in Wash. Coll. — Agricultural topics, esp. breeding; botany and geol. California; sanitation; general biol.

*Physical geog. 2, 32.

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Ph.D., Yale, 1871; Prof. Geology. — Formerly Prof. Geol. and Palæontol., Cornell; U. S. Geolog. Survey. — Palæontology, stratigraphy and correlat. of Dev. and Carb., etc., and gen. princip. palæontol. and histor. geol.

Geol. hist. of organisms. 2, 32.

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Ph.D., Yale, 1876; Prof. of Physics. — Ed. *Am. Jour. Sci.* — Mineralogy.

*Mineralogy and crystallog. 2, 32.

Descript. mineral. 1, 32.

S. L. PENFIELD,

Ph.B.; Asst. Prof. Mineralogy. — Mineralogy and crystallog.

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